Index

1. Safety advice

1.1 Applications of the machine
1.2 Attention of the machine
1.3 Nameplate
1.4 Read before operating this machine
1.5 Safety warning logo
  1.5.1 Observe all of the warnings and cautions below
  1.5.2 Safety warning logo
1.6 Operator safety notes
  1.6.1 Proper operators position
  1.6.2. Operator safety notes

2. X4 series Specs

2.1 Technical parameters
2.2 Parts
2.3 Installation
  2.3.1 Moving the machine
  2.3.2 Installation

3. The operation of the machine

3.1 Instruction of the user interface panel
3.2 Pinout diagram for plug
3.3 Software setup
  3.3.1 Mach3 driver
  3.3.2 Interface of mach3
  3.3.3 how to use xml file
  3.3.4 pin config of mach3
3.4 Instruction of mach3
  3.4.1 The Mach3 interface screen
  3.4.2 MDI screen
  3.4.3 X, Y, Z axis motor Tuning interface
  3.4.4 Tool path Display interface
  3.4.5 Mach3 Diagnostics
  3.4.6 home the machine

4. Maintenance

4.1 Machine maintenance and cleaning
4.2 The adjustment of machine
4.3 The list of replacement parts
4.4 Common Faults
4.5 The list of tools for Maintenance

5. Detailed Mechanical Drawings

5.1 Feature for x4 series
5.2 Parts feature
5.3 Parts list

6. Electrical Diagrams

6.1 Power input
6.2 Electrical schematic
6.3 Electrical layout plan
6.4 Coolant setup
6.4.1 cool setup for x4 series
6.5 Electrical parts list
6.6 Electrical parts instruction
6.6.1 Five axis interface board instruction
6.6.2 X4 plus control board instruction
6.6.3 Spindle control board instruction
6.6.4 Stepper motor driver instruction
6.6.5 Transformer instruction
6.6.6 4th Axis instruction

7. Troubleshooting

7.1 Overview
7.1.1 Attention
7.1.2 Troubleshooting overview
7.2 Troubleshooting
7.2.1 Power distribution
7.2.2 Computer control
7.2.3 Axis driver
7.2.4 Spindle driver

1. Safety advice

1.1 Applications of the machine

The machine can be used for drilling and milling processing, the machine is controlled Mach3 software which is install in the personal-computer with parallel port, it's applicable to producing the small parts, and it can be also used for Teaching Training or a model machine.

1.2 Attention of the machine

- Do not exceed maximum processing capacity.
- Do not use in humid environment or in poor lighting
- Don't start the Machine without lubrication.
- No one without professional training shall not be allowed to operating the machine directly.
- Do not to operate the machine in the influence of alcohol, drugs or fatigue.

1.3 Nameplate

- Company Name: Syil Electronic&Hardware Co.,ltd
- Machine name: CNC milling machine drilling
- Machine types: x4+
- Machinery factory code:
- Machinery factory date:
- Machinery weight: 165 kg
- Machinery Size: (L-W-H) 1190 x780x960
- Address: 20# Yuyao City, Zhejiang Province Xiao Dong Fan Road industrial area
- Website: www.syil.cn
- Tel: +86-574-62735995/996/997
- Nameplate is shown in Figure 1-1

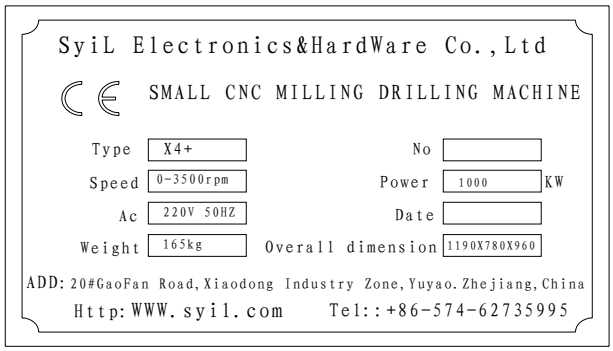


Figure 1-1

CE

Verification Of MD & LVD COMPLIANCE

LT VARIFICATION #MD080901-01CN , MD090513-03
Date issued: MAY/13/09
TCF# SL0805A27
Applicable Standards: ENISO 12100-1:2003 EN ISO 12100-2 EN 13128:2001 EN 60204-1:2006

1.4 Read before operating this machine

- Only authorized personnel should work on this machine. Untrained personnel present a hazard to themselves and the machine, and improper operation will void the warranty.
- Check for damaged parts and tools before operating the machine. Any part or tool that is damaged should be properly repaired or replaced by authorized personnel. Do not operate the machine if any component does not appear to be functioning correctly. Contact your shop supervisor.
- Use appropriate eye and ear protection while operating the machine. ANSI-approved impact safety goggles and OSHA-approved ear protection are recommended to reduce the risks of sight damage and hearing loss.
- Do not operate the machine unless the doors are closed and the door interlocks are functioning properly. Rotating cutting tools can cause severe injury. When a program is running, the mill table and spindle head can move rapidly at any time in any direction.
- The Emergency Stop button (also known as an Emergency Power Off button) is the large, circular red switch located on the front Control Panel. Pressing the Emergency Stop button will instantly stop all motion of the machine, the servo motors, the tool changer, and the coolant pump. Use the Emergency Stop button only in emergencies to avoid crashing the machine.
- The electrical panel should be closed and the key and latches on the control cabinet should be secured at all times except during installation and service. At those times, only qualified electricians should have access to the panel. When the main circuit breaker is on, there is high voltage throughout the electrical panel (including the circuit boards and logic circuits) and some components operate at high temperatures. Therefore, extreme caution is required. Once the machine is installed, the control cabinet must be closed and only serviced by qualified electricians.
- DO NOT modify or alter this equipment in any way. If modifications are necessary, all such requests must be handled by Syil electronic, Inc. Any modification or alteration of any Syil Milling or Turning Center could lead to personal injury and/or mechanical damage and will void your warranty.
- Consult your local safety codes and regulations before operating the machine. Contact you dealer anytime safety issues need to be addressed.

It is the shop owner's responsibility to make sure that everyone who is involved in installing and operating the machine is thoroughly acquainted with the installation, operation, and safety instructions provided with the machine BEFORE they perform any actual work. The ultimate responsibility for safety rests with the shop owner and the individuals who work with the machine.

- **This machine is automatically controlled and may start at any time.**
- **This machine can cause severe bodily injury.**
- **Do not operate with the door open.**

1.5 Safety warning logo

1.5.1 Observe all of the warnings and cautions below

- Do not operate without proper training.
- Always wear safety goggles.
- Never place your hand on the tool in the spindle and press spindle FWD, spindle REV, Im "MDI mode" M06 causes a tool change cycle. The mill could start and crush your hand.
- The electrical power must meet the specifications in this manual. Attempting to run the machine from any other source can cause severe damage and will void the warranty.
- DO NOT press POWER UP/RESTART on the control panel until after the installation is complete.
- DO NOT attempt to operate the machine before all of the installation instructions have been completed.
- NEVER service the machine with the power connected.
- Improperly clamped parts machined at high speeds/feeds may be ejected and puncture the safety door. Machining oversized or marginally clamped parts is not safe.
- Windows must be replaced if damaged or severely scratched - Replace damaged windows immediately.
- Do not process toxic or flammable material. Deadly fumes can be present. Consult material manufacturer for safe handling of material by-products before processing.
- The spindle head can drop without notice. Personnel must avoid the area directly under the spindle head.

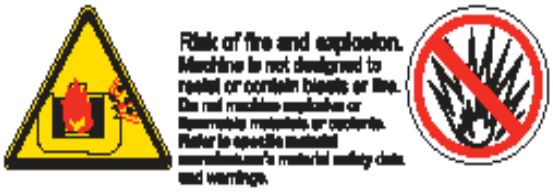
1.5.2 Safety warning logo

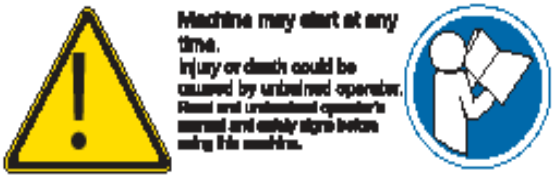
USES AND GUIDELINES FOR PROPER MACHINE OPERATION

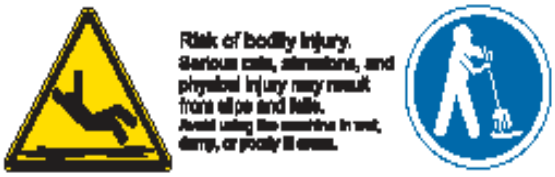
All milling machines contain hazards from rotating cutting tools, belts and pulleys, high voltage electricity, noise, and compressed air. When using milling machines and their components, basic safety precautions should always be followed to reduce the risk of personal injury and mechanical damage. READ ALL APPROPRIATE WARNINGS, CAUTIONS, AND INSTRUCTIONS BEFORE OPERATING THIS MACHINE.

MODIFICATIONS TO THE MACHINE

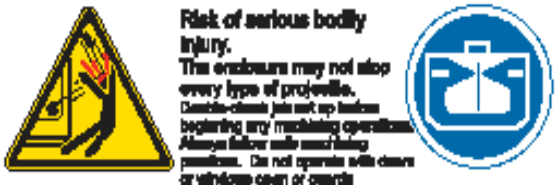
DO NOT modify or alter this equipment in any way. If modifications are necessary, all such requests must be handled or instructed by a syil or a syil distributor . Any modification or alteration of any Syil machining center could lead to personal injury and/or mechanical damage and will void your warranty.







Risk of serious physical injury. Machine cannot protect from bodies.
Coolant mist, fine particles, chips, and fumes can be dangerous.



Safety windows may become brittle and lose effectiveness when exposed to machine coolants and oils over time.
If signs of discoloration, crazing, or cracking are found, replace immediately.
Safety windows should be replaced every two years.

Unattended Operation

Enclosed Syil CNC machines can be operated unattended; however, your machining process may not be safe to operate unmonitored. All programs must be proofed and tested with a operator present.

Be aware if the program you are running is a aggressive or time consuming program, this can cause thermal overload on the stepper motors. If the stepper motors thermal overload, this can cause the motors or cnc to loose steps, this can result in a major crash.
These types of crashes can cause damage to the machine, tooling and work piece.

As it is the shop owner's responsibility to set up the machines safely and use best practice machining techniques, it is also their responsibility to manage the progress of these methods. The machining process must be monitored to prevent damage if a hazardous condition occurs.

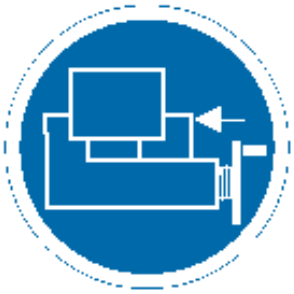
For example, if there is the risk of fire due to the material machined, then an appropriate fire suppression system must be installed to reduce the risk of harm to personnel, equipment and the building. A suitable specialist must be contacted to install monitoring tools before machines are allowed to run unattended.

It is especially important to select monitoring equipment that can immediately perform an appropriate action without human intervention to prevent an accident, should a problem be detected.

WARNING

Severe injury can occur.
Moving parts can entangle and trap.
Always secure loose clothing and long hair.

Risk of serious bodily injury.
Follow safe clamping practices. Inadequately clamped parts can be thrown with deadly force.
Securely clamp workpieces and fixtures.



Impact hazard.
Machine components can crush and cut.
Do not handle any part of the machine during automatic operation.
Always keep clear of moving parts.

Moving parts can crush.
The tool changer will move in and crush your hand.
Never place your hand on the spindle and press ATC FWD, ATC REV, NEXT TOOL, or cause a tool change cycle.

⚠ WARNING

Severe injury can occur.
Moving parts can entangle and trap.
Always secure loose clothing and long hair.

Risk of serious bodily injury.
Inadequately clamped parts can be thrown with deadly force.
High RPM reduces chuck clamping force.
Do not machine using an unsafe setup or exceed rated chuck RPM.

Moving parts can cut.
Sharp tools can cut skin easily.
Do not handle any part of the machine during automatic operation.
Do not touch rotating work pieces.

Risk of serious bodily injury and impact hazard.
Unsupported bar can whip with deadly results.
Do not extend barstock past end of drawtube without adequate support.
Do not apply excessive machining forces, doing so can dislodge the bar from support.
Do not allow the carriage or tool to strike the steady rest or tailstock; the part may come loose.
Do not over tighten steady rest.

• Strong signs:

• Motors on the two-phase rotating signs:

• Grounding symbol:

Grounding signal PE signal

1.5 Attention of the operator

1.5.1 Operators position: it's shown in Figure 1-6.

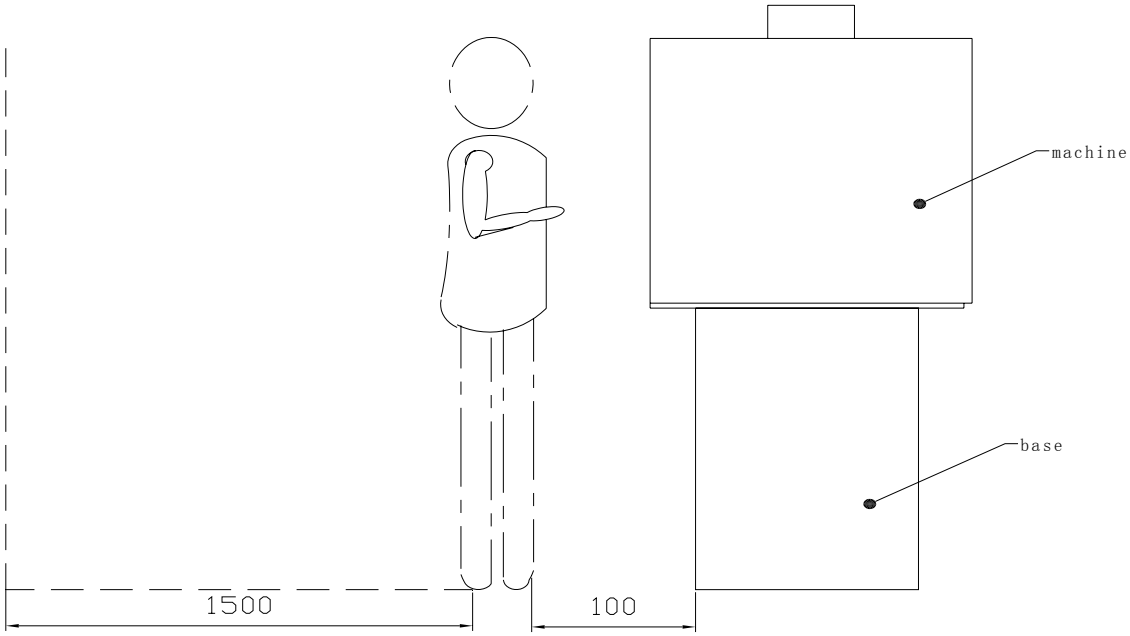


Figure 1-6

1.6.2. Operator safety notes

• Machines in operation must be installed before the commissioning, and run-time noise does not exceed 85 DB, can damage hearing.

• During the course of operation of machinery, the operator is required to wear approved protective eye wear, to avoid foreign debris. Do not operate without gloves, do not contact cutters / endmills without protective gloves, sharp endmills can easily cut un protected skin.

• When the machine in starts it is imperative have all body parts out of the machines work area.

• When the machine is powered, DO NOT open the back of the machine to expose the electronics, as there as serious risk of electrical shock and could result in death.

• Always know where the emergency stop button is located (E STOP), in the event of a emergency depress Emergency stop button. This button will terminate the electrical current to the machine, including all stepper motors and the spindle. Be aware that there is always a slight delay from the time the buttons is depressed to the actual stop of the motors.

• Always wear approved steel toe safety boots.

• Make sure all long hair is tied back, and be cautious of loose clothing. As loose hair or clothing could be come entangled in the spindle and cause serious injury or death.

• Always know what the machine is going to do prior to starting a program, this achieved by knowing and understanding "g code". if you are unfamiliar with G code, it is strongly suggested the you do not operate a CNC (computer numerical control) machine, until you full understand G code.

• Prior to operating a CNC understand speed and feeds, and the effect that improper feed and speeds can impact your tooling . (ie) if your speeds and feeds are incorrect it can break your tooling,HSS (high speed steel) or carbide tooling can be fatal when it breaks.

2. X4 series Specs

2.1 Technical parameters

Specification of X4 plus:

Max. drilling capacity:	25mm
End mill capacity	16mm
Face mill capacity	50mm
Max. distance spindle to table	350mm
Spindle taper	MT#3orR8
Spindle speed	100-3500rpm
Table effective size	550x160mm
T-slot size	12mm
T-slot number	3
Machining precision	0.02mm
Spindle box travel (z)	170mm
Table cross travel(x）	280mm
Table longitudinal travel(y)	150mm
Motor output power	1000W
Overall dimension(LxWxH)	685x560x830mm
Weight (Net/Gross)	175/208Kg
Packing size(LxWxH)	840x820x1040mm

2.2 Parts in packing

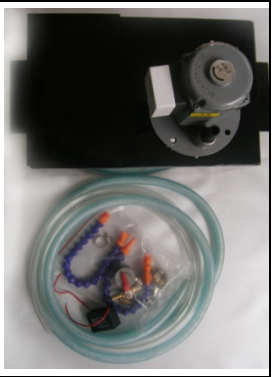
- Open the packing of X4.
- Checking products & parts.

- Parts in x4 plus

Include: Machine , parallel Cable, PC tray, Simple package, Salver

Options：Mill chuck set, 4th axis kit , Coolant system, stand

NO	Parts	Picture	NO	Parts	Picture
1	X4 Electronics		2	Cable	

3	PC tray		4	Mill chuck set	
5	4th kit		6	Coolant system	
7	stand		8	Salver	
9	Simple package		10	MPG	

2.3 Installation

2.3.1 Moving the machine

2.3.1.1 Machine should be moved as Figure 2-2

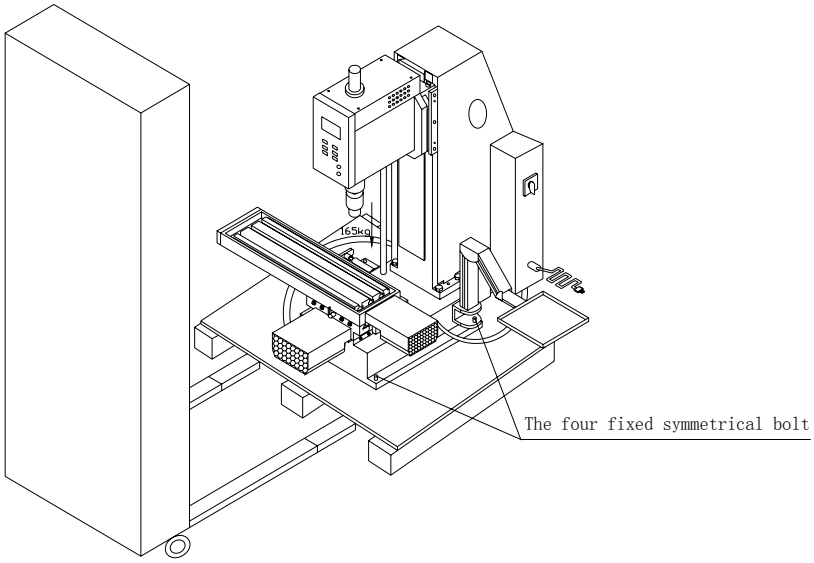


Figure 2-2

2.3.1.2 Attention

- At in the shipping crate the machine is bolted to the base,it is best to move the machine with a forklift.
- Do not lift the machine via the spindle head, this can cause permanent damage to the machine
- Keep level and avoid bumps this may cause the machine to tilt unexpectedy.

2.3.2 Installation

2.3.2.1 The working environment

This high-precision CNC machine require a dust-free working environment, other things that will increase the production of high quality parts are good lighting, adequate ventilation, no vibration, no corrosion and operating in normal room temperature. Solid mounting can make a major difference it the parts you can produce, vibration can lead to tool chatter. This chatter will affect the finish of the parts you are producing.

2.3.2.2 Installation

All functions of this machine are pre installed except for the 4th axis kit、coolant system and base.

- It is best to installing the machine in natural light or well light area.

- In order to ensure the accuracy of machine, the machine should be installed in the stable table. It is very important to level the machine, this done by adjusting the leveling feet on the base of the machine. Place a long level flat on the table, and adjust all feet until the vertical and horizontal level of error in 0.04/1000 mm range.
- The place of the installing sockets is as Figure 2-4
- Adjustment is as Figure 2-3

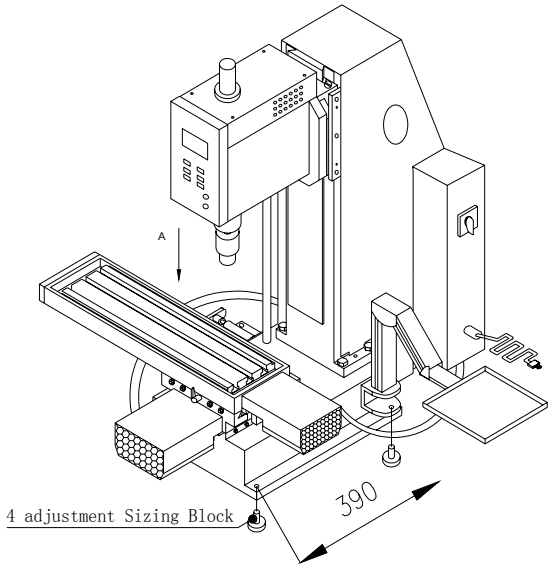


Figure 2-3

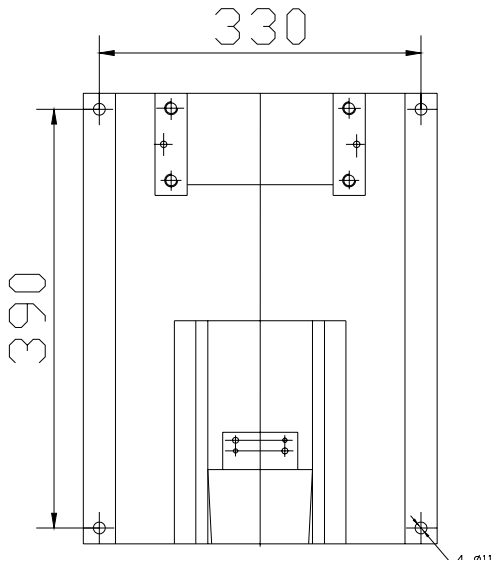


Figure 2-4

2.3.2.3 Disassembly

If the Machine must be Disassemble, disconnect / lockout power. During the disassembly process the parts should placed by the order and labeled to avoid confusion when assembly.

2.3.2.4 Adjustment of machine

- during the manufacturing process of the x4 our precision machinery has already aligned and adjusted the machine, for initial use there is no need for any adjustments.

- Before working, Check all non moving parts, it will increase the rigidity of the machine. But don't over tighten, as this can damage the machine deformation.

- prior to machining it is extremely important to lubricate moving parts (#2 machine oil)

3. Operation of the machine

3.1 Instruction of the user interface panel

- Interface panel for x4 plus

The keys of the panel is as Figure 3-2

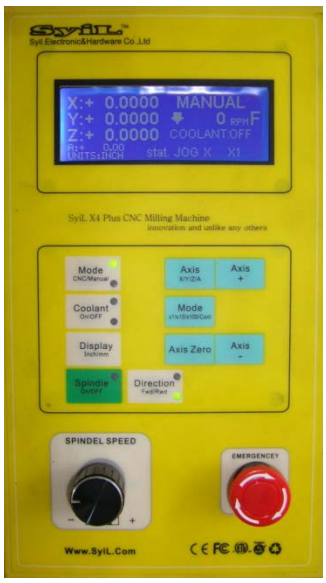
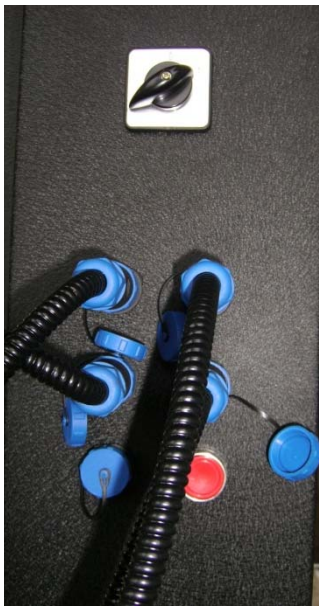


Figure 3-2

- Mode cnc/manual: switch to cnc mode or manual mode
- Coolant on/off: turn on/off coolant pump by manual.
- Display mm/inch: switch to mm mode and inch mode
- Spindle on/off: turn on/off the spindle, when the green led is light ,the spindle is run ,otherwise the spindle will stop.
- Direction Fwd/Rwd: control the spindle run forward or reserve.
- Axis X/Y/Z/A: choose the axis which you want to move in manual mode.
- Mode x1/x10/x100/cont: choose the moving mode which you want to. This button can switch to MPG mode, MPG only be used in manual mode.
- Axis Zero: make the coordinates of axis to zero.
- Axis+: make the axis move forward by manual.
- Axis-: make the axis move back by manual.
- Black switch: change the spindle rpm from 0 to 5000.
- E-stop switch(red button switch): when the switch is pressed, the machine will emergency stop.

3.2 Pinout diagram for plug



- The plug for x4 plus

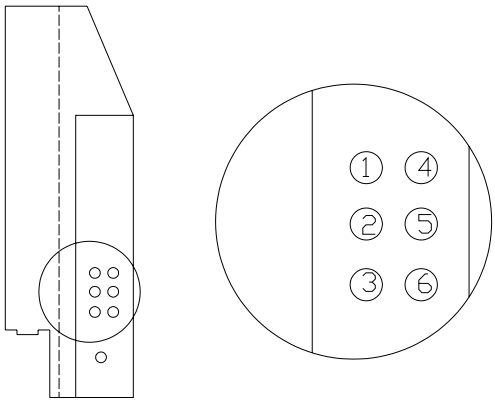


Figure 3-6

The plugs is as Figure 3-6:

- plug1 is for x-limit switch
- plug2 is for y-limit switch
- plug3 is for 4th -axis
- plug4 is for x-axis
- plug5 is for y-axis
- switch6 is the switch for 4th –axis power supply

Attention: Pay special attention to the Connection, or the machine will not work.

3.3 Software setup

If you don't have a copy of mach3 first download a copy at

http://www.machsupport.com/downloads.php,

make sure to download the newest version * Lockdown: * Mach3 R2.63.

After downloading and installing the software it is vital to reboot the computer as the installer will prompt. Do not start up mach3 without this vital reboot, if you do not do this you will have to manually remove mach3 from your system and reinstall. It is best to install mach3 in to the default directory , C drive as this can make things easier for trouble shooting.

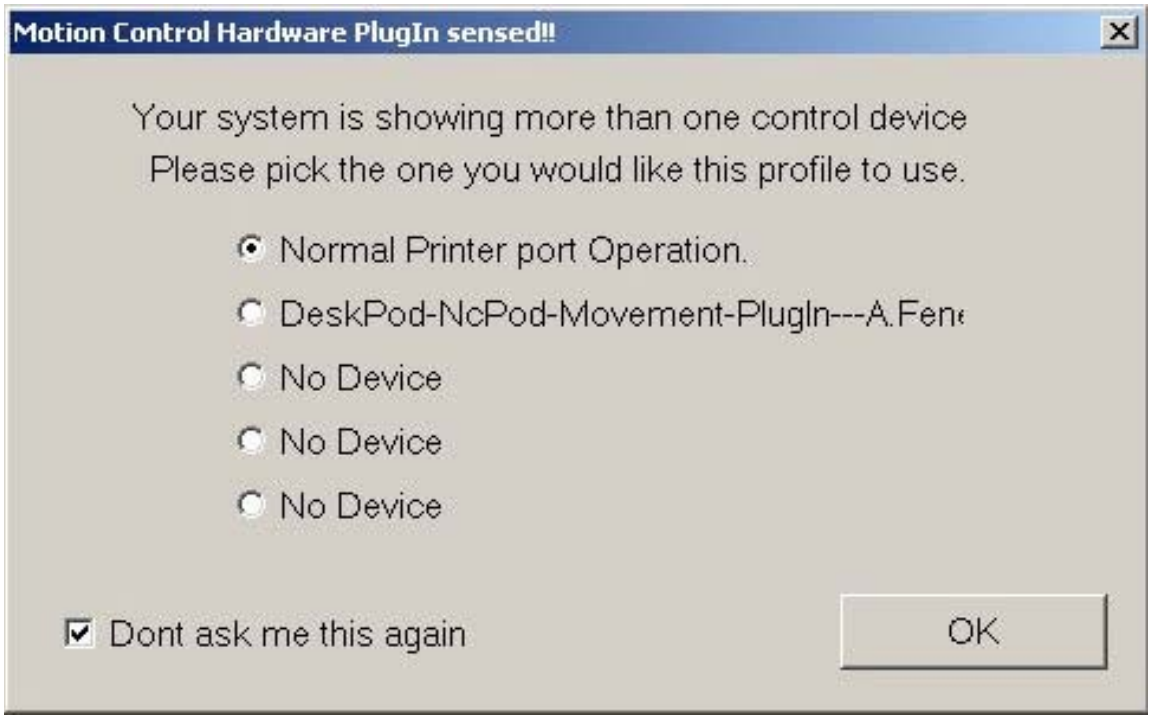

Motion Control Hardware PlugIn sensed!!
Your system is showing more than one control device
Please pick the one you would like this profile to use.
Normal Printer port Operation.
DeskPod-NcPod-Movement-PlugIn---A.Fen
No Device
No Device
No Device
Dont ask me this again
OK

Figure 3-8

After install you may see this screen as Figure 3-8, if you don't see this screen, don't worry about it.
Printer port operation will be set as then click OK and Don't ask me this again.

3.3.1 Mach3 driver

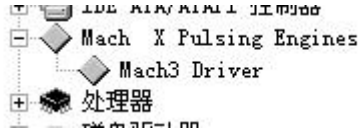
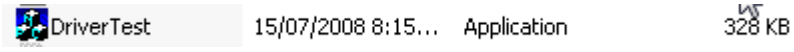


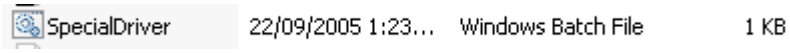
Figure 3-9

After you have completed the installation of mach3，see mach3 driver 'MACH3 DRIVER' in device manager(as Figure 3-9)，or the machine will be out of control.

To check to see if the drive installed properly you then can confirm this by, "C drive", "mach3", look down the list until you see:



By opening this software Mach3 will do a test on the driver, if this fails you must reinstall Mach3 or use In the same directory.



3.3.2 Interface of mach3

After you start the software ,the interface of mach3 is as Figure 3-10

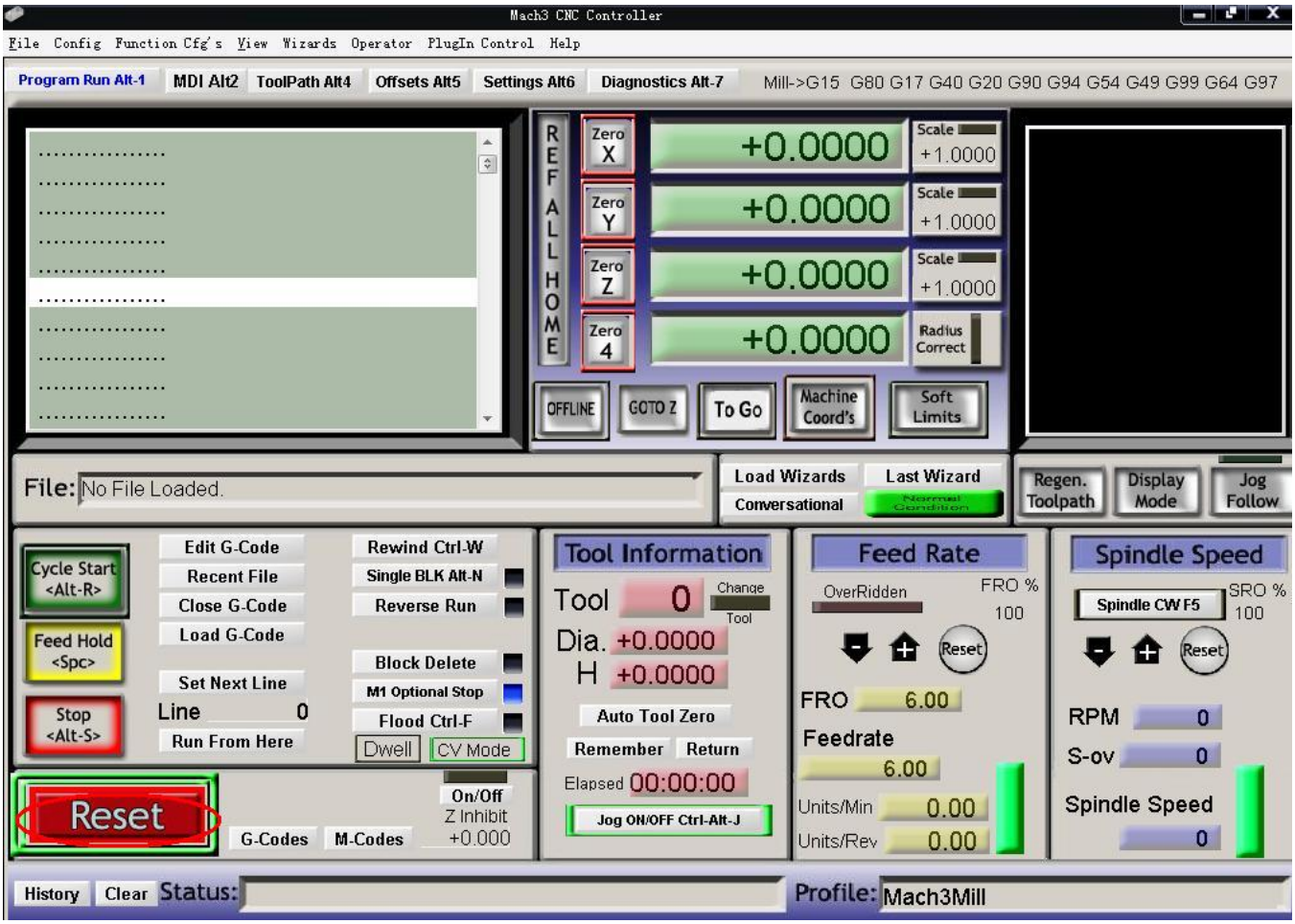


Figure 3-10

Attention: Before you attempt to control the machine with mach3,the button of RESET must be inactive.

3.3.3 how to use xml file

Your syil distributor should have provided you with a syil .XML file, this file is a setup file for mach3. This file will make your installation plug and play. locate this .xml file and copy it by right clicking and select COPY. Open "MY COMPUTER" select the ``C DRIVE``, `mach3``. Paste this .xml file in to a open place in the directory, do not paste in to any internal mach3 folders.

MACH3 LOADER

Open the mach3 loader and select the x4 profile(as Figure 3-11)

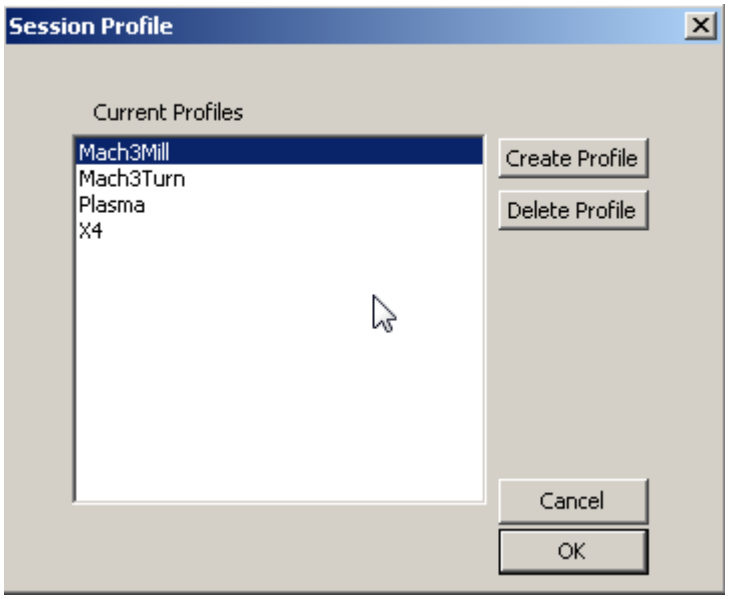


Figure 3-11

3.3.4 pin config of mach3

After get into the mach3 interface, please check the pin config, make sure they are right, the pin of x4 is as Figure 3-12

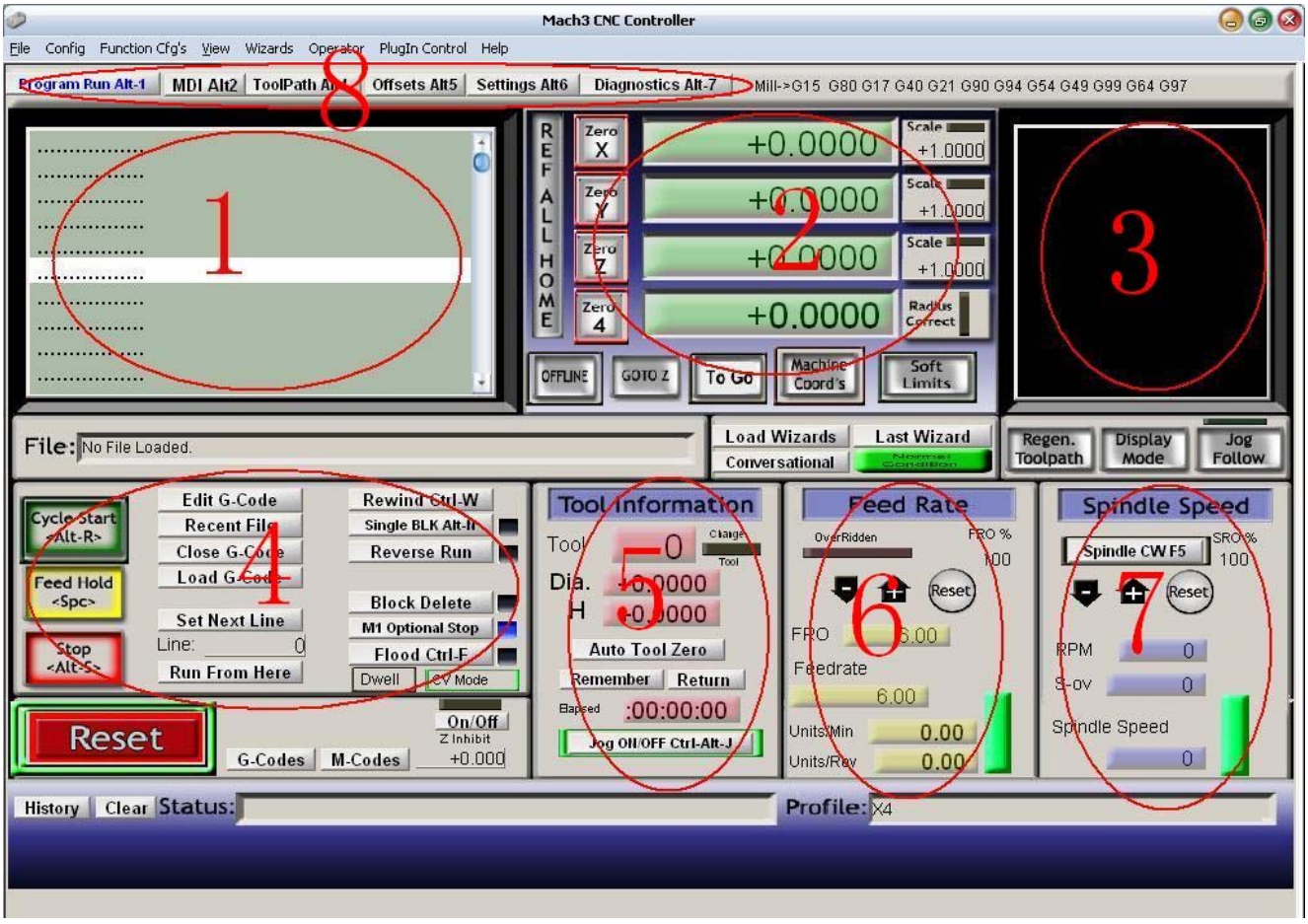
Figure 3-12

Signal name	pin	I/O of the Signal
X pulse	7	output
X dir	17	output
Y pulse	6	output
Y dir	8	output
Z pulse	5	output
Z dir	16	output
A pulse	4	output
A dir	14	output
Spindle pulse	2	output
Spindle dir	1	output
Signal 1	3	output
Signal 2	9	output
X home	12	input
Y home	13	input
Z home	10	input
A home	15	input
E-stop	11	input

The information should all ready be pre set in the (x4).xml file

3.4 Instruction of mach3

3.4.1 The Mach3 interface screen



1: Mach3 Gcode window, user this will display the current active gcode program, the white bars shows the line that is currently active.

2: (DRO) this digital read out shows the current location of each axis, in either work piece coordinates or machine coordinates
3: this will display the tool cutting path, this window can be very useful. If your program is loaded you should see the similar part. (if you do not you might not want to push the start button).
The mouse can be used to change the perspective.

4: interface procedures:
Cycle start: To run current loaded program
Feed hold: program suspended
Stop: stop program (do not use as estop) in emergency use ESTOP
Edit G-code: Edit current program
Recent file: the recent run-off procedures document
Close G-code: Close the program

Load G-code: loading program files
Set next line: a set of enforcement procedures
Line: is currently running a number of
Run from here: from the current line running show that in the white bar
Rewind: re-start procedures
Single BLK: a single operation (this will advance 1 line each time cycle start button is pushed)
Reverse run: repeat run
Block delete: delete breakpoint
M1 optional stop: to stop the use of M1 code
Flood: turn on coolant

5: Tool information:
This information is crucial to proper tool changes and setting up tools in the tool table. The tool displayed is the tool that is currently active, as well as the current height offsets.

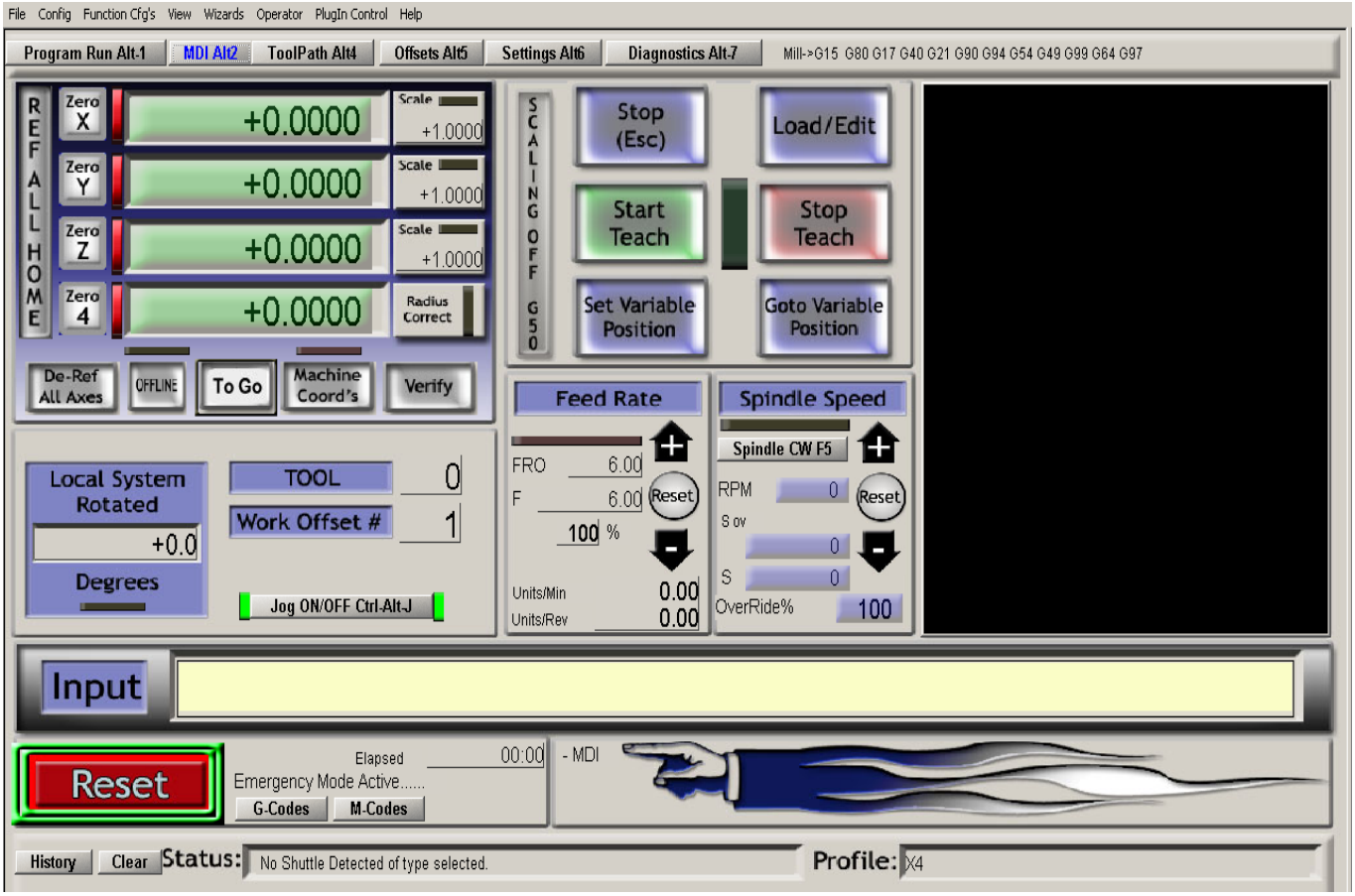
6: Feed interface:
FRO: this displays the current programmed feed. This number can be manually changed only if a M48 is used in your starting lines of code.

7: spindle speed control interface:
Spindle F5 CW: this butto is used to start the spindle manually.

RPM: spindle speed feedback display interface. In the absence of spindle speed feedback, which will appear as 0.
S-ov: Theory should reach spindle speed, RPM and that can be compared.
Spindle speed: spindle speed manual adjustment interface.
You can also manually enter the spindle speed.

8: Mach3 Tabs.
Program run: Comprehensive program control interface.
MDI: manual data Input.
Toolpath: tool path control interface.
Offsets; used to set up work piece cords (g54) and tool length offsets .
Settings: Alter mach3 settings
Diagnostic: Used to diagnose mach in case of problems.

3.4.2 MDI screen



MDI (manual data input)
This screen is very helpful, simply type in the a code command in to the white line this allow for quick and easy manoeuvrability. (eg) to move all axis to work piece home just type in (g00 x0y0z0) or to send machine to home position type in (G28)

This is a complete list of MACH3 gcodes

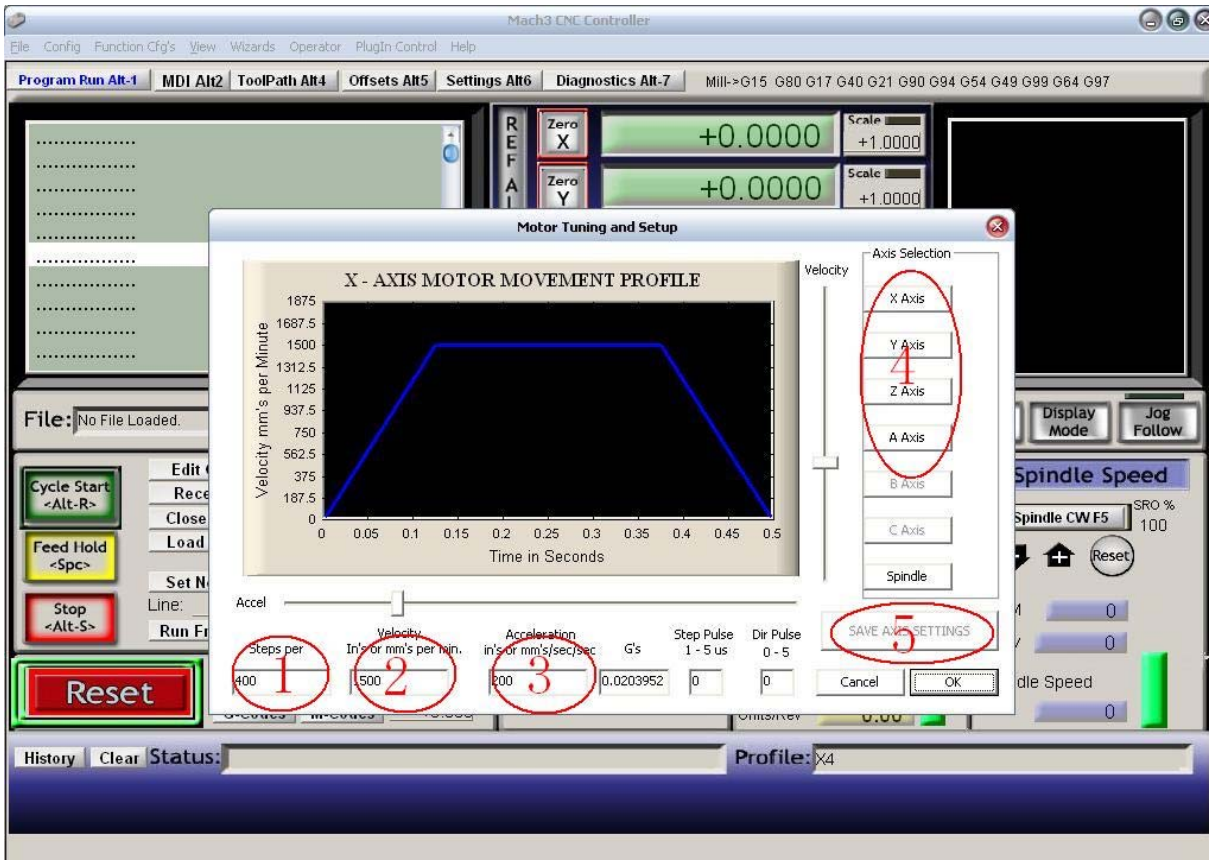
G-code	Functions	G-code	Functions
G0	Rapid positioning	G53	Move in absolute machine coordinate system
G1	Linear interpolation	G54 à G59	Use fixture offset 1 to 6, G59 to select a general fixture number
G2	Clockwise circular / helical interpolation	G61	Exact Stop mode
G3	Counterclockwise circular / helical interpolation	G64	Constant Velocity mode
G4	Dwell	G73	Canned cycle - drilling - fast pullback
G10	Coordinate system origin setting	G80	Cancel canned cycle mode
G12	Clockwise circular pocket	G81	Canned cycle - drilling
G13	Counterclockwise circular pocket	G82	Canned cycle - drilling with dwell
G15	Polar Coordinate moves in G0 and G1	G83	Canned cycle - peck drilling
G16	Cancel polar Coordinate moves in G0 and G1	G84	Canned cycle - right hand rigid taping (not yet implemented)
G17	XY plane select	G85	Canned cycle - boring, no dwell, feed out
G18	XZ plane select	G86	Canned cycle - boring, spindle stop, rapid out
G19	YZ plane select	G87	Canned cycle - back boring (not yet implemented)
G20	Inch unit	G88	Canned cycle - boring, spindle stop, manual out
G21	Millimeter unit	G89	Canned cycle - boring, dwell, feed out
G28	Return machine home (parameters 5161 to 5166)	G90	Absolute distance mode
G30	Return machine home (parameters 5181 to 5186)	G91	Incremental distance mode
G28.1	Reference axis	G92	Offset coordinates and set parameters
G31	Straight Probe	G92.1	Reset G92 offset and parameter
G40	Cancel cutter radius compensation	G92.2	Reset G92 offset but leave parameters untouched
G41	Start cutter radius compensation left	G92.3	Recall G92 from parameters
G42	Start cutter radius compensation right	G93	Inverse time feed mode
G43	Apply tool lenght offset (plus)	G94	Feed per minute mode
G49	Cancel tool lenght offset	G95	Feed per revolution mode
G50	Reset all scale factors to 1.0	G98	Initial level return after canned cycles
G51	Set axis data input scale factors	G99	R-point level return after canned cycles

This a complete list of mach3 M codes

M-code	Functions
M0	Program stop
M1	Optional program stop
M2	Program end
M3 / M4	Rotate spindle clockwise/counterclockwise
M5	Stop spindle rotation
M6	Tool Change (by two macros)
M7	Mist coolant on
M8	Flood coolant on
M9	All coolant off
M30	Program end and rewind
M47	Repeat program from first line
M48	Enable speed and feed override
M49	Disable speed and feed override
M98	Call subroutine
M99	Return from subroutine/repeat

3.4.3 X, Y, Z axis motor Tuning interface

-



This is the X, Y, Z axis adjust the speed of the interface, located in the motor tuning config settings,

1: Pulse settings,

this drives the need to set for the syil products, the default setting is for 400 metric and 10160 for imperial. These numbers are imperative to the proper operation of your machine.

2: velocity,

This directly controls the inches or mm per min, in your rapid movements (G00)

If you tune this to quickly this can result in lost steps and damage to your work piece and can result in a major crash. Contact your distributor prior to changing this setting.

3: Acceleration adjustment:

This setting controls how fast the stepper motor get to the designated Velocity, again too fast and this can result in lost steps.

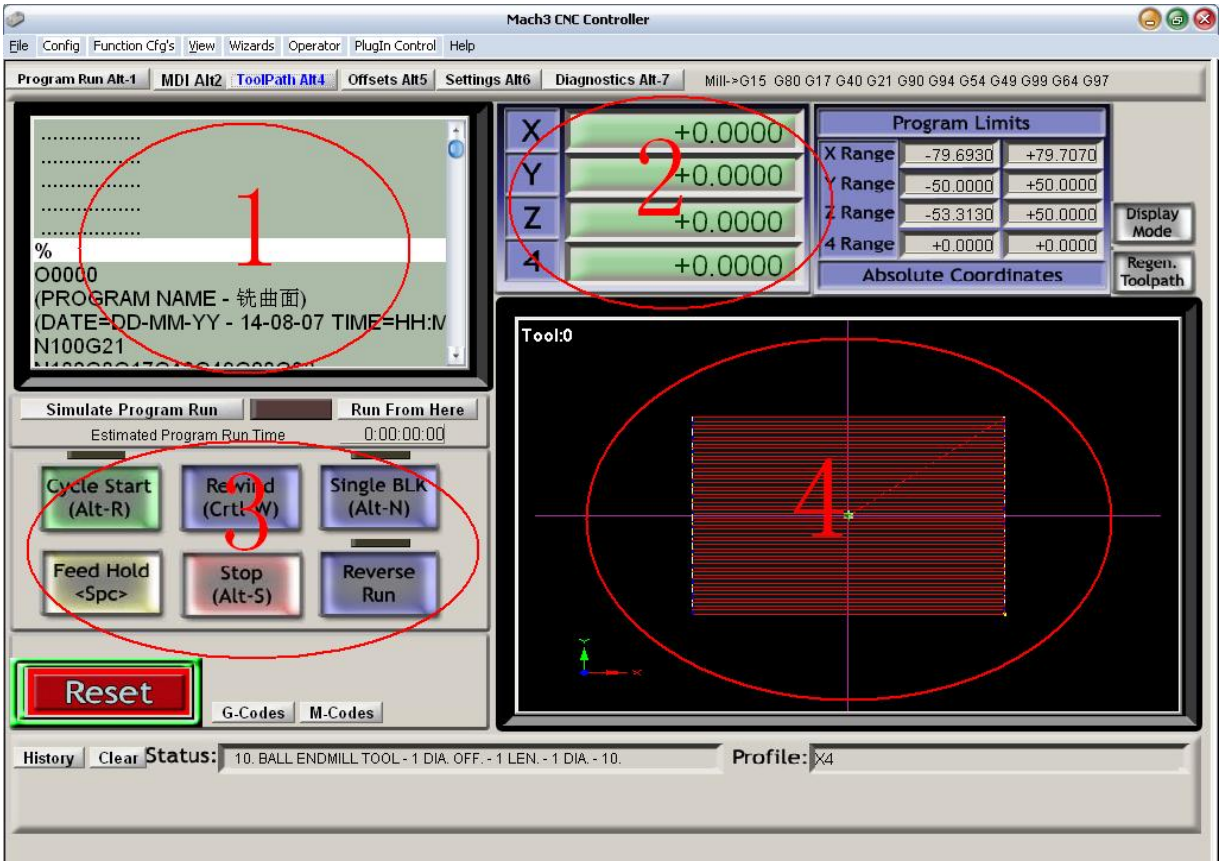
4: Switch-axis:

This allows you select each individual axis to tune, you must select save axis in order to use the changed parameters. This must be done on each axis.

NOTE: Motor tuning is like tuning a guitar, it is a perfect balance between, steps, velocity, and acceleration. If you do not know what you are doing, we do not suggest

altering these setting without contacting a dealer.

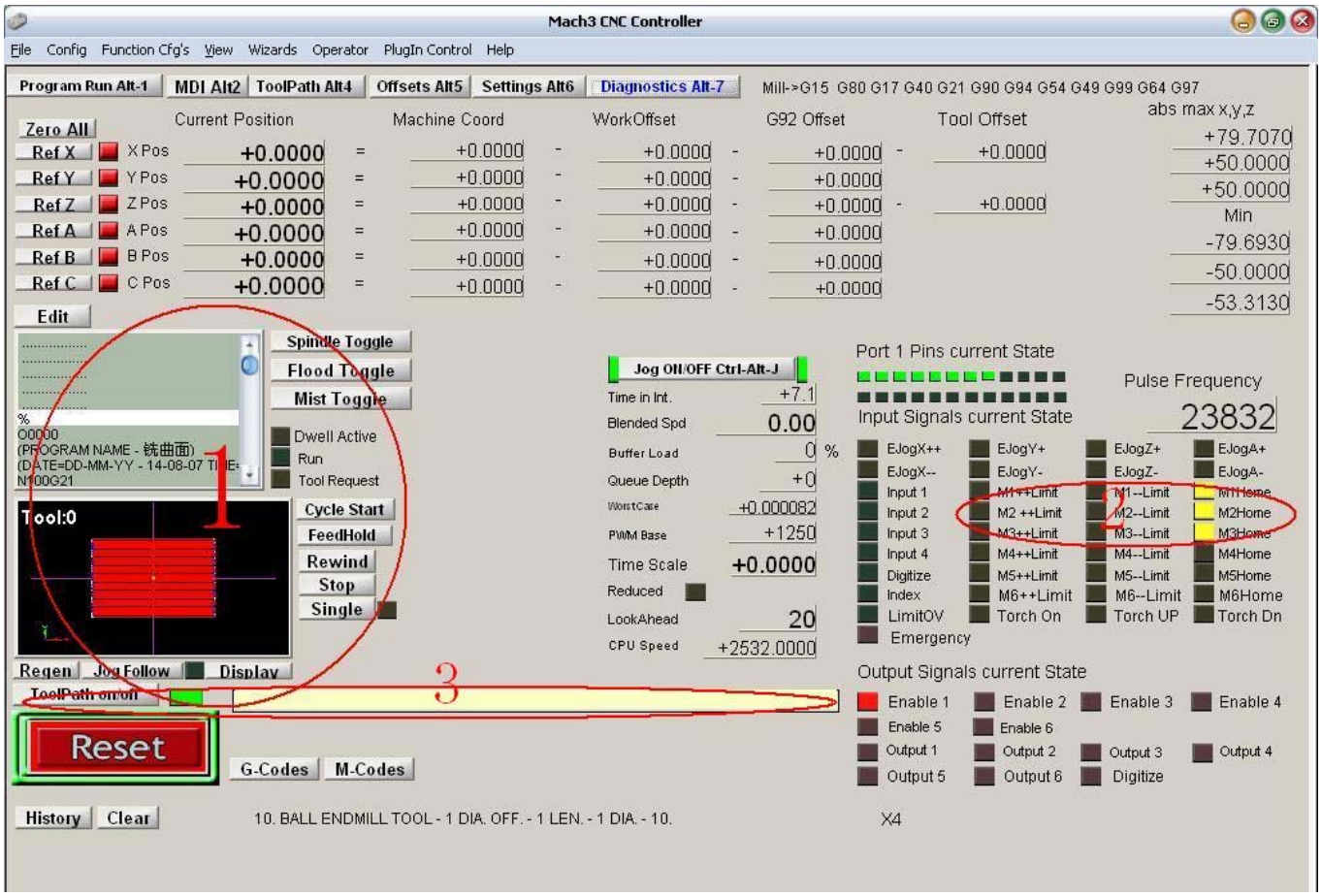
3.4.4 Tool path Display interface



This is the tool path observation interface, integrated interface corresponding to 1,2,3,4.

This screen is larger and can aid in observation of the current program, also the simulate program is helpful as I can give a estimated program run time.

3.4.5 Mach3 Diagnostics



Digonstic interface,

This screen is very useful in knowing what your machine is doing, this is extremely helpful in case you are having issues with the machine. This screen is set up to allow you to still run your program and see exactly what you machine is doing.

1: Displays current gcode program.
2: Shows input and out put signals from your machine and computer.
3: MDI (manual data input) line allows for manual input of gcode.

This screen can be very useful to check communication between the machine and the computer, simply depress one of the x or y homing switches and you will see the corresponding light illuminate.

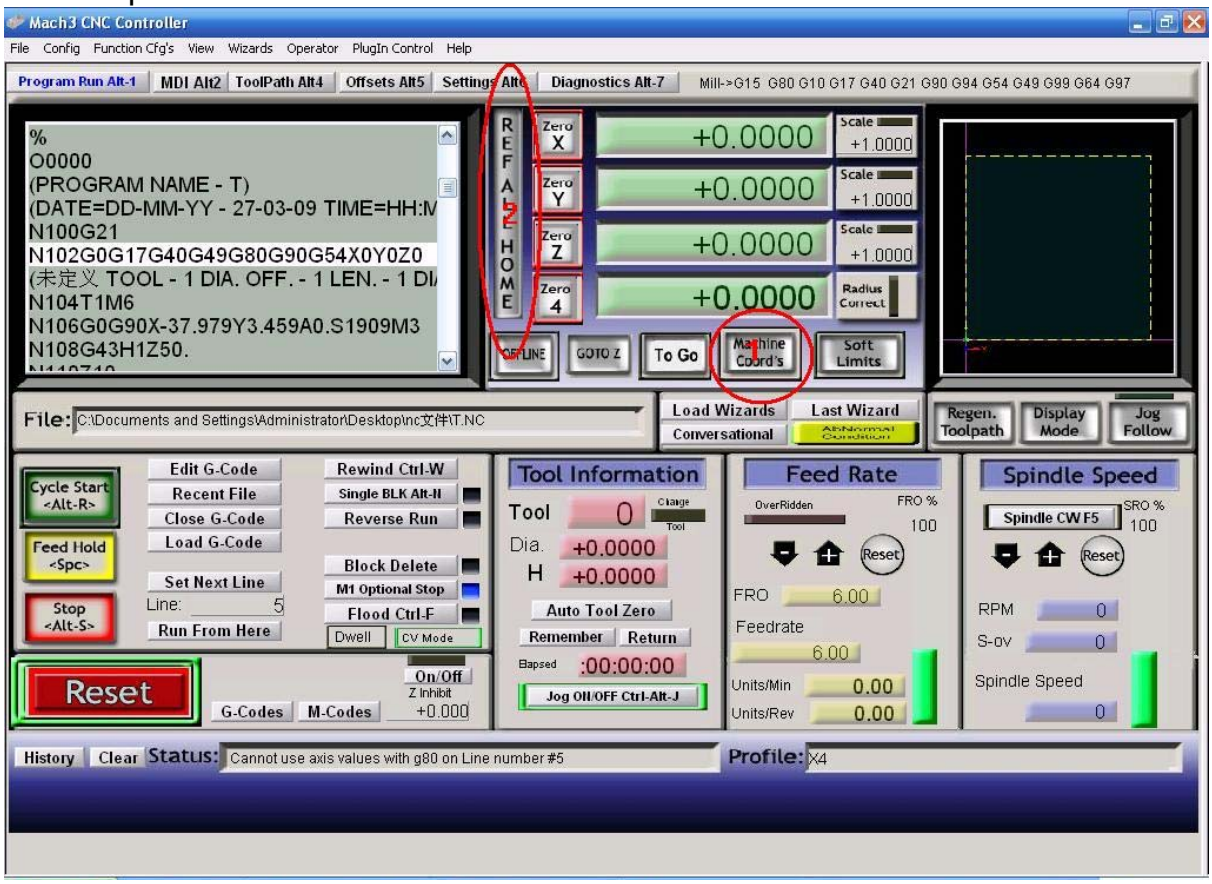
3.4.6 home the machine

Homing the machine is when you send the X,Y and Z to the homing switches, this crucial the producing precise parts and components. The machine knows is positioning in space due to mathematical calculations, on how far away it is from its homing switch. It is extremely important to home the machine every time you power up the machine, and or the computer.

This is achieved by going to the main mach3 screen set,

#1 push the machine crord's button, you will know it is active when the light around it is red.

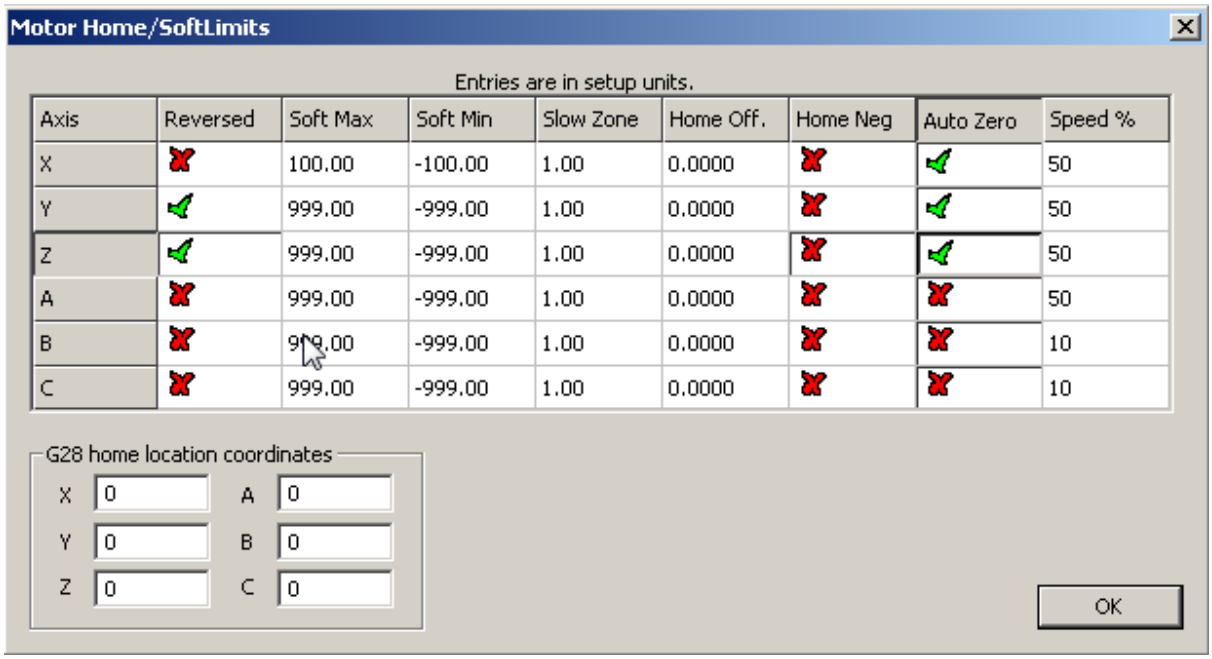
#2 then push the "REF ALL HOME" button.



This will send all axis home to the switches, for this function to work properly you must have the auto Zero set under 'config', - homing and limits.

NOTE: it is always best to make sure that your tool is completely clear of the work piece prior to homing the machine.

You can change the direction of axis and home axis in the following screen:



4. Maintenance

4.1 Machine regular maintenance and cleaning

- Keep the work place clear and dry ,make sure there is good lighting in working room.

- Make the machine keep clear of swarf, this is especially true if you are cutting hard metals. These metals can over time act like sand paper and damage the machine. Lubricate all moving parts before working, and run the machine three minutes without cutting anything, this allow the machine to warm up.

- Clean the machine after working, pooling of some coolant can lead to rusting of the machine • Maintain the machine table surface and rails. Periodocily you may need to tighten the gibbs, Do not over tighten.

- After you have completed the program ,remember to shut down your machine , cut off power supply And clean the excess coolant off the keyboard, monitor .

- Periodic removal of the table, check bed, table wear track surface conditions. If the situation is not normal wear and tear, should be re-adjusted bed, table of lubricating oil.

4.2 The adjustment of machines

When the machine was produced at the factory, it has been adjusted carefully, the user does not need to do any adjustment. However, after using for a long time, because of wear track, with rails Vice gap is too large, maybe it should be adjusted.

- Insert the head of the column with the adjustment, as shown in Figure 4-1

  In the nose right in the nose and between the pillars, a long retreat of the Stubbs inserts. Insert (40 parts) of a top adjustment screw (39 parts), the need to be adjusted when the screw, a screw adjustment slowly, with computer-controlled side of the head movement, until feel a slight resistance to.

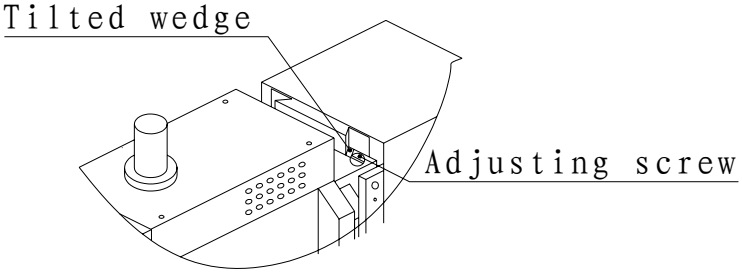


Figure 4-1

- Workbench with the pallet, the pallet base and inlay of the adjustment, as shown in

Figure 4-2

Table at the front, between the table and pallet (between the pallet and base) have an inlay of the inlay of a number of positive adjustment screw, when the gap needs to be adjusted, the first release of the adjustment screw on the nut And then Xuanjin adjustment screw, I feel a slight resistance, locking nut .

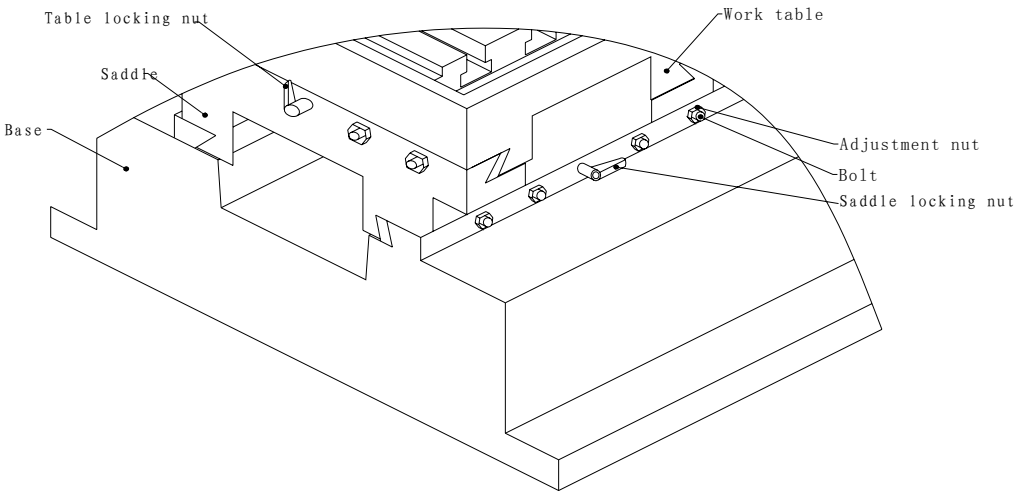


Figure 4-2

4.3 The list of regular replacement parts

The list is as figure 4-3

No	Description	Q'ty	Units	Remarks
1	Verticality couping	3		
2	Limit switch	2		
3	Fuses	1		
4	Z-axis spacing of a photoelectric	1		

Figure 4-3

4.4 Common Faults

- Failure1: even on the data lines, connected to power, open the power switch, the exigency stop switches, machines do not accept computer signals.
  Solution: Check whether the software emergency stop is depressed, if the RESET button is flashing, and machines will not cannot be moved.

- Fault 2: X, Y, Z axis one cannot be moved, or moving very smoothly.

Solution: Check stepper motor drive and a connection between the general problem for off-line.

- fault3: X, Y, Z axis can be moved smoothly, but cannot control the spindle.
  Solution: Check front the panel switch has switched to computer-controlled state, if switch fails the machine will not engage in cnc mode.

- failure 4: The ball screw is making noise?
  Solution: add to the axle lubricant, adjusting the stepper motor drive output current to an appropriate value, Ballscrew will be quieter. Also check for and metal chips material lodged in the nut of the ballscrew.

- fault5: After time the machine has lost it's percision ?
  Solution: Adjustment of Gibbs (wedge tapers).

- Fault6: Table cannot be moved.
  Solution: check table locking nut, or check the stepper motor wiring.

- Fault7: spindle using manual and computer control cannot be activated.
  Solution: Open emergency stop switch.

4.5 The list of tools for Maintenance

The list is as Figure 4-4

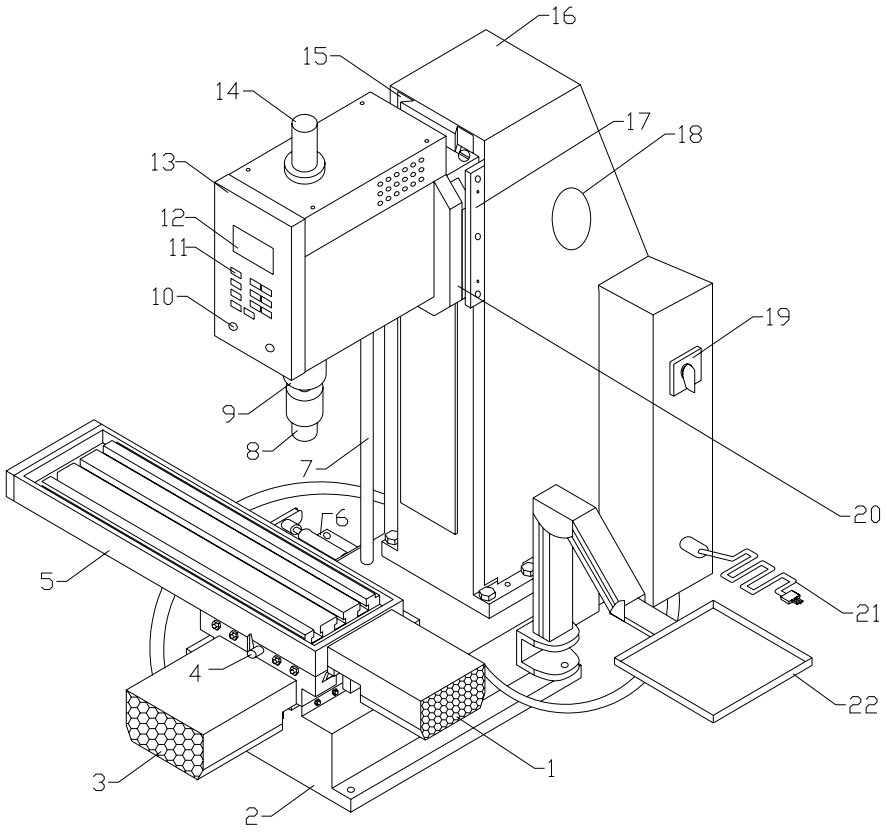
No	Description	Q'ty	Units	Remarks
1	opening wrench	5		
2	hexagonal wrenches	8		
3	double-headed opening wrench	5		
4	Plum screwdrive	5		
5	special wrench 5	1		

Figure 4-4

5. Detailed Mechanical Drawings

5.1 Feature for x4 series

Feature

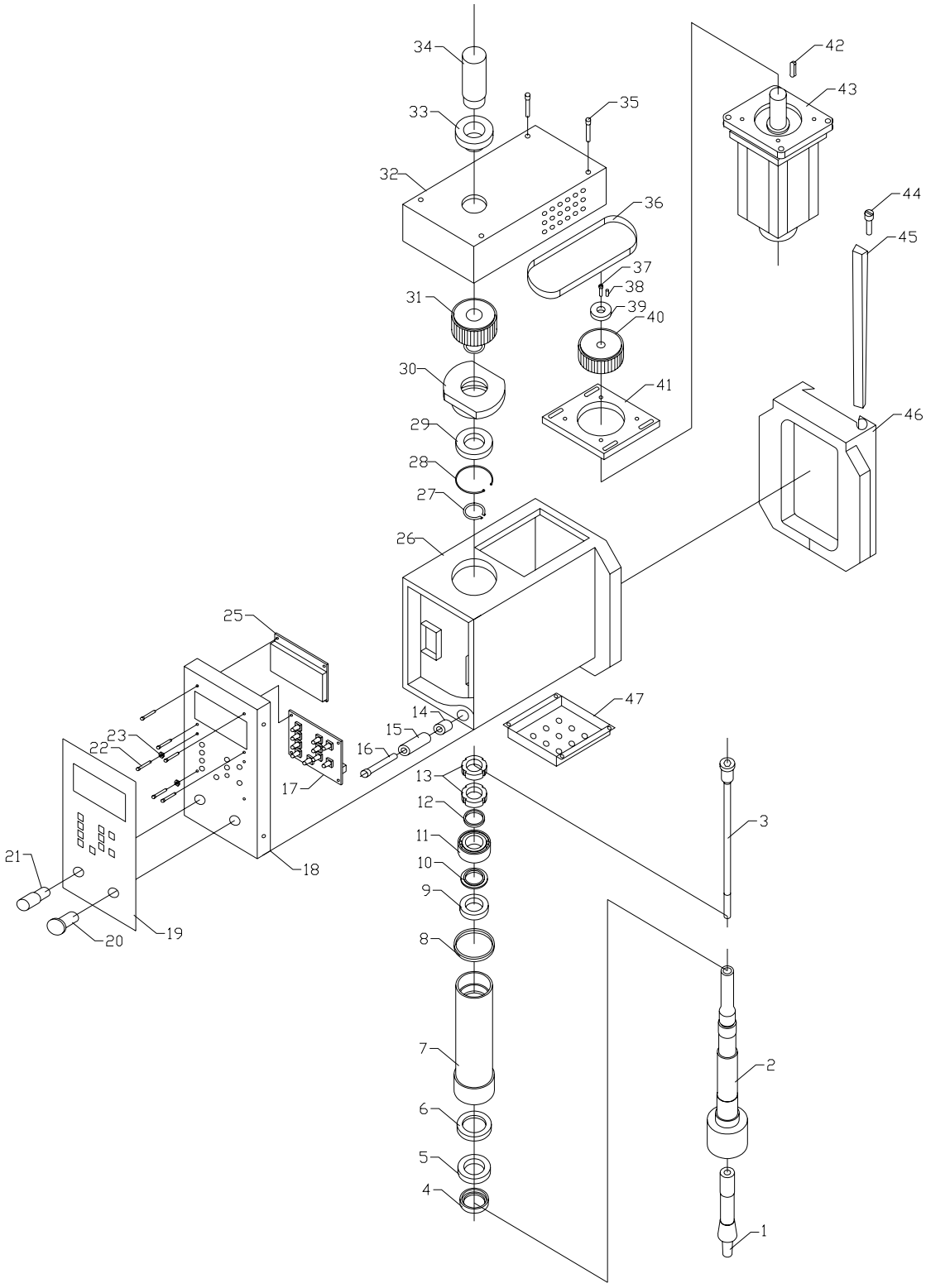


1	Cover for X axis motor	12	Rotate speed display
2	Base	13	Faceplate
3	Cover for Y axis motor	14	Protective cover
4	Lock handle	15	Fuselage
5	Worktable	16	control box
6	Lubricate system	17	Plywood
7	Gas springs	18	system fan
8	Collet for milling or drilling	19	Power switch
9	Principal axis	20	Rotate connect plate
10	Emergency stop switch	21	Power plug
11	Touch switch panel	22	Bracket for PC

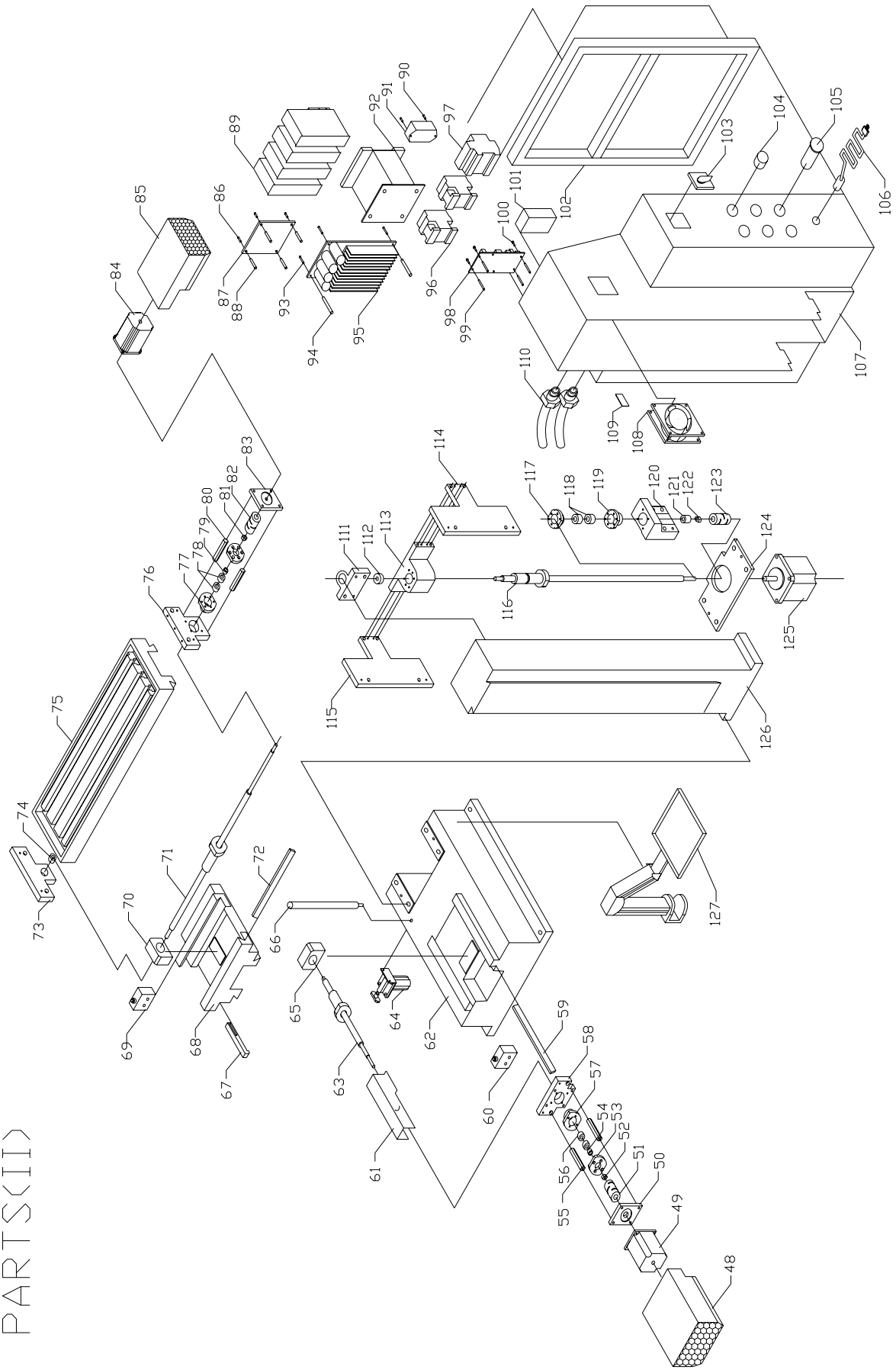
5.2 Parts feature

- Parts list of x4 plus

PARTS(I)



PARTS(II)


48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127

PART LIST

No.	Description	Q'ty	No.	Description	Q'ty
1	Traper shank	1	25	LED-board	1
2	Spindle	1	26	Spindle box	1
3	Lock bolt	1	27	Check ring 35	1
4	Under oil seal I	1	28	Check ring 65	1
5	Taper bearing	1	29	Bearing	1
6	Under oil seal П	1	30	Bearing seat	1
7	Spindle sleeve	1	31	Synchronization pulley	1
8	Sleeve limit pad	1	32	Spindle box cover	1
9	Bearing	1	33	Dustproof cover I	1
10	Under washer П	1	34	Dustproof cover П	1
11	Bearing	1	35	Hexagon socket cap head screws	4
12	Under washer I	1	36	Timing belt	1
13	Small round nut	2	37	Screm M16x10	1
14	Spingle peg sleeve I	1	38	Pin 3x10	1
15	Spingle peg sleeve П	1	39	Washer	1
16	Lock bolt	1	40	Motor timing pulley	1
17	Touch board	1	41	Verticality motor support plate	1
18	Switch panel	1	42	Key 5x25	1
19	surface mask	1	43	Brushless motor	1
20	Emergency stop switch	1	44	Adjusting screw	1
21	Potentiometer	1	45	Tilted wedge	1
22	Hex Nuts	4	46	Vertical slide	1
23	Bolt M4X30	4	47	Spindle box cover	1
24	Bolt M3X25	4	48	Cover for cross motor	1
49	Cross step motor	1	75	Work table	1

50	Cross motor support plate	1	76	Portrait screw support plate	1
51	Cross couping	1	77	Portrait bearing seat	1
52	Nut	1	78	Bearing	2
53	Cross bearing cover	1	79	Bush	1
54	Bush	1	80	Portrait motor support pole	4
55	Cross motor support pole	1	81	Nut	1
56	Bearing	2	82	Portrait couping	1
57	Cross bearing seat	1	83	Portrait motor support plate	1
58	Cross screw support plate	1	84	Portrait step motor	1
59	Cross wedge	1	85	Cover for portriat motor	1
60	Limit switch I	1	86	Bolt M3x15	4
61	Cover for screw	1	87	Interface board	1
62	Base	1	88	Hexagon Copper Cylinder	4
63	Cross ball bearing screw	1	89	X、Y、Z、A motor driver	4
64	Petrol pump	1	90	Bolt M3x5	2
65	Seat for cross nut	1	91	Filter	1
66	Gas springs	1	92	Transformer	1
67	Limit block	1	93	Bolt M3x20	4
68	Saddle	1	94	Fixed rod M3X30	4
69	Limit switch Π	1	95	Mainboard	1
70	Seat for portrait nut	1	96	Fuse	2
71	Portrait ball bearing screw	1	97	Leakage Protector	1
72	Portrait wedge	1	98	Interface board Ⅰ	1
73	Portrait bearing seat	1	99	Fixed rod M3X20	1
74	Bearing	1	100	Bolt M3x10	5
101	Power supply	1	115	Side support plate Π	1
102	Trunking	1	116	ballbearing crew	1

103	Power switch	1	117	Verticality bearing cover	1
104	Air Access Plug	5	118	Bearing	2
105	Shell	1	119	Verticality bearing seat	1
106	Power line	1	120	Veticality screw support plate	1
107	Cortrol box	1	121	Bush	1
108	Cooling fan	1	122	Nut	1
109	Parallel port	1	123	Verticality couping	1
110	Tube connecter	1	124	Verticalitu motor support plate	1
111	Verticality bearing seat	1	125	Verticality step motor	1
112	Bearing	1	126	Verticality lead rail	1
113	Seat for verticality nut	1	127	Computer plank	1
114	Side support plate I	1			

6. Electricity instruction

6.1 Power input

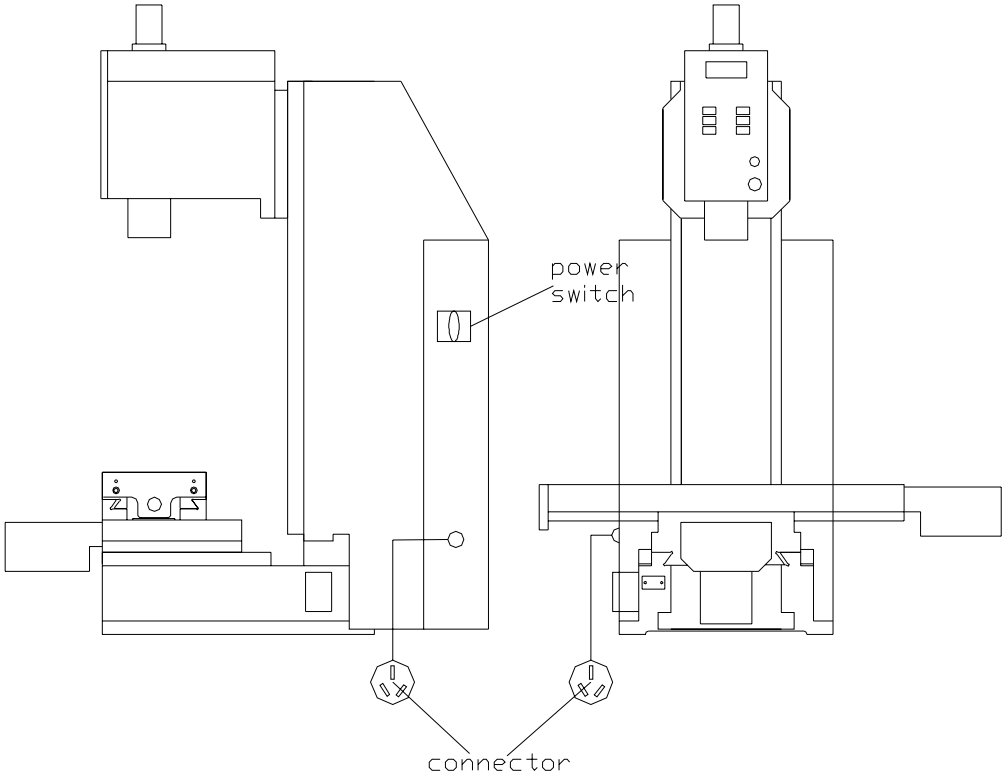


Figure 6-1

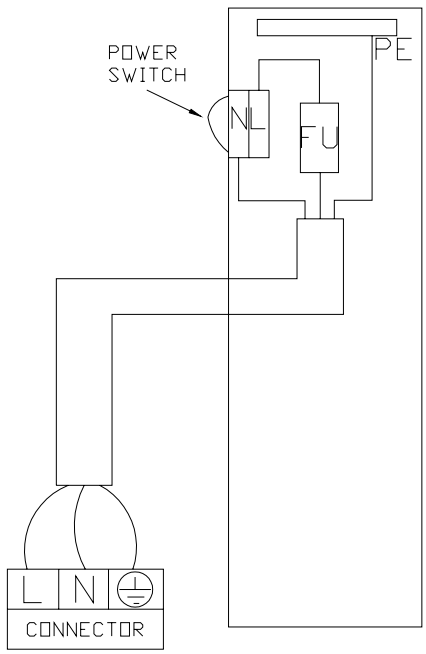
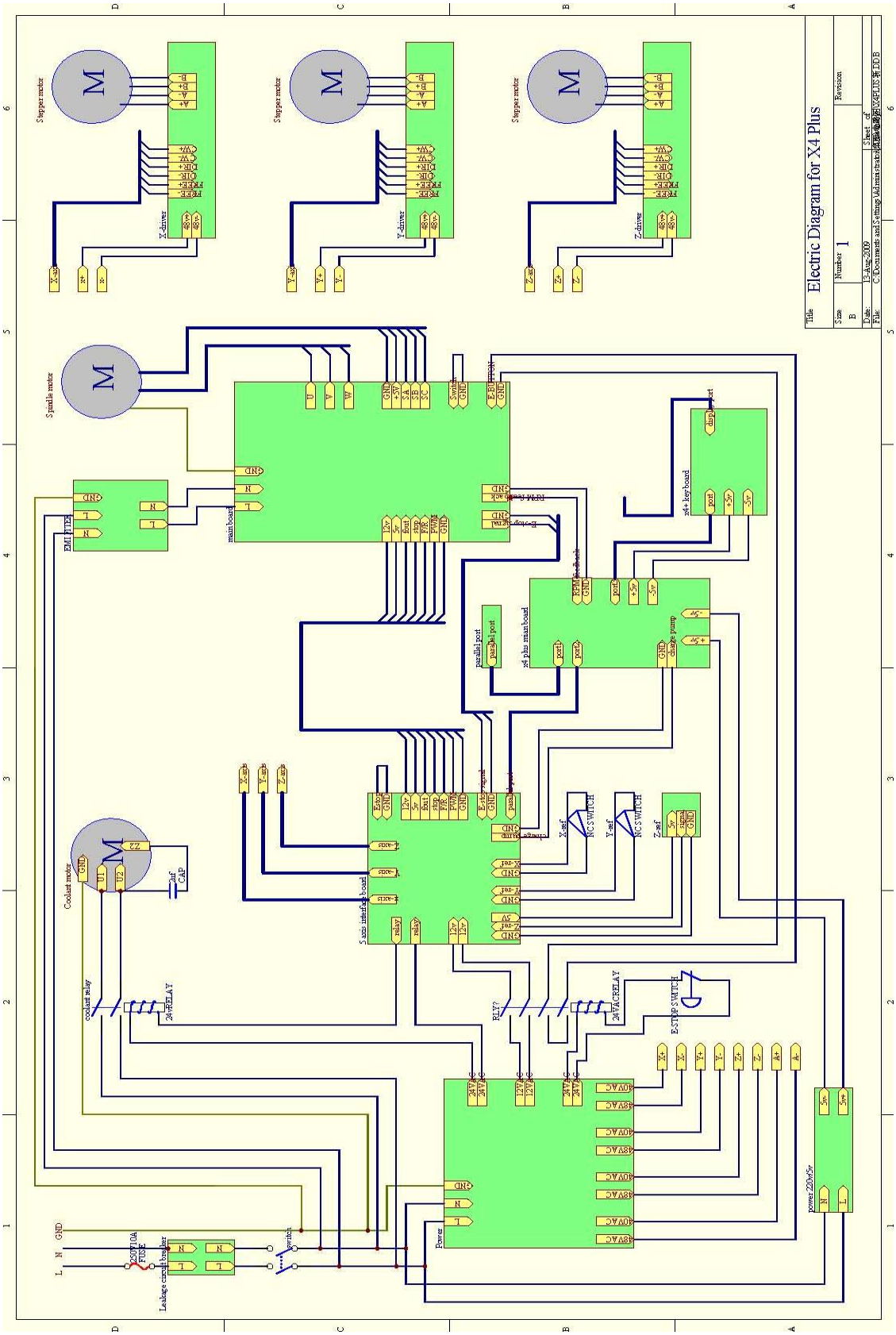


Figure 6-2

6.2 Electricity schematic

- Schematic for x4 plus



6.3 Electrical layout plan

• Layout plan for x4 plus

The layout is as Figure 6-4

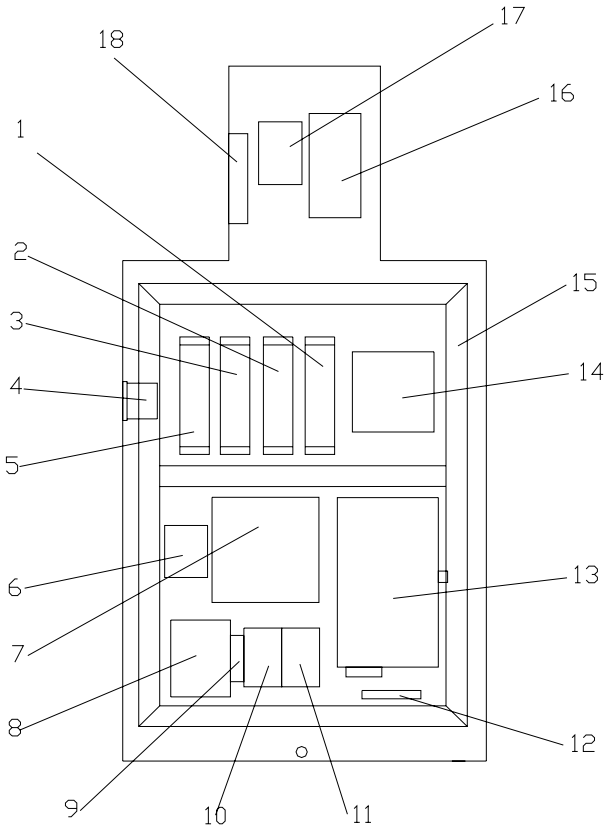


Figure 6-4

1. x-axis driver
2. y-axis driver
3. z-axis driver
4. switch
5. 4th-axis driver
6. filter
7. transformer
8. Leakage circuit breaker
9. Fuse
10. AC.contactor for e-stop
11. AC.contactor for coolant
12. connection for GND
13. spindle control board
14. five axis interfaceboard
15. Trunking
16. x4 plus control board
17. power supply(220v to 5v)
18. system fan

6.4 Coolant setup

6.4.1 cool setup for x4 series

• Pump wiring：as Figure 6-5,supply 220v/110vto U1 and U2 which on the pump, then connect Capacitance to W1 and Z2，the wiring of pump wiring is completed。

• Relay wiring：now we use two relays，the first relay is on the 5 axis interface board（Figure 6-7），which is controlled by 5vdc，it control the s.econd relay，the second relay（Figure 6-7）is use as switch for the power of pump, the wiring is follow Figure 6-7.

• The install place of coolant pump is as figure 6-8

This is only to be done by a qualified electrician

Figure 6-6

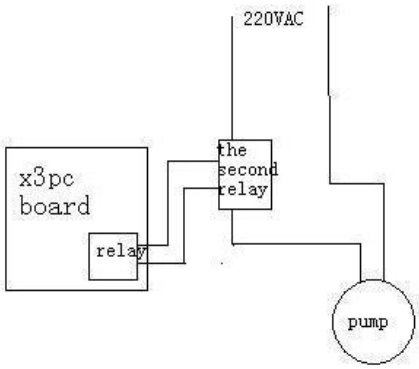


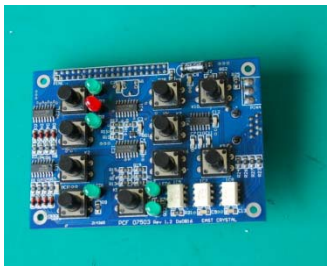
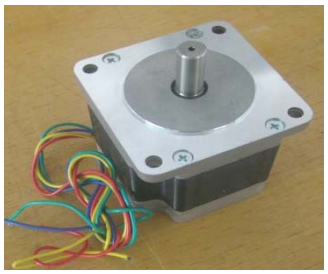
Figure 6-7

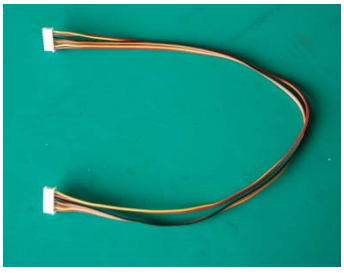
Figure 6-8

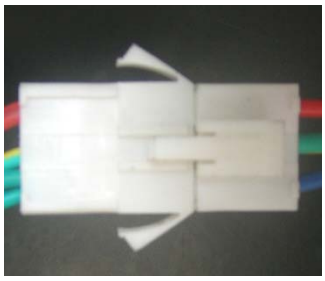
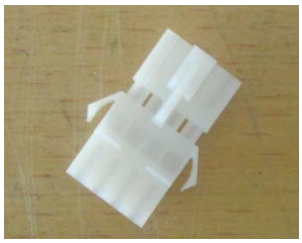
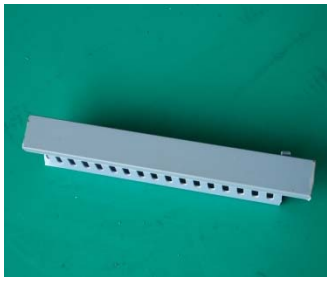
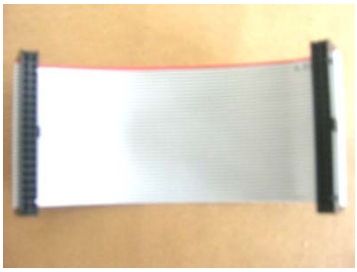
6.5 Electricity parts list

- Parts list for x4 plus

The parts list is as follow:

NO	Parts	Picture	NO	Parts	Picture
1	spindle control board		2	spindle motor	
3	Key board		4	LED-board	
5	five interface board		6	Trans Former	
7	Stepper motor driver		8	X,Y,A stepper motor	
9	z stepper motor		10	Leakage circuit breaker	

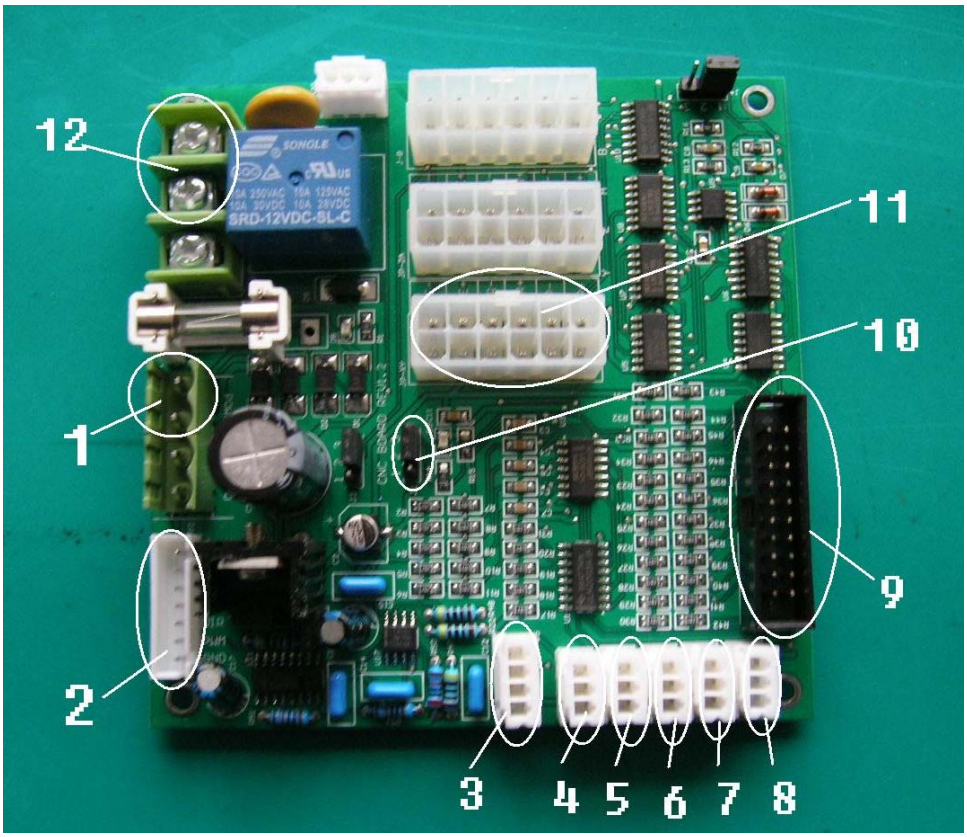
11	15 pin port		12	home/ limit switch	
13	fuse		14	E-stop switch	
15	plug		16	filter	
17	power wire		18	switch	
19	Wire (5 pin)		20	Key board power supply wire	
21	Power Supply (5vdc)		22	7-pin wire (short)	

23	20 pin cable		24	3 pin plug	
25	4 pin plug		26	Parallel port	
27	4 pin cable		28	Switch for 4th driver power supply	
29	connect ion		30	A.C Contactor	
31	Trunk ing		32	2o pin cable	
33	Potent iomete rs		34	16 pin cable (long)	

6.6 Circuit board reference

6.6.1 Five axis interface board

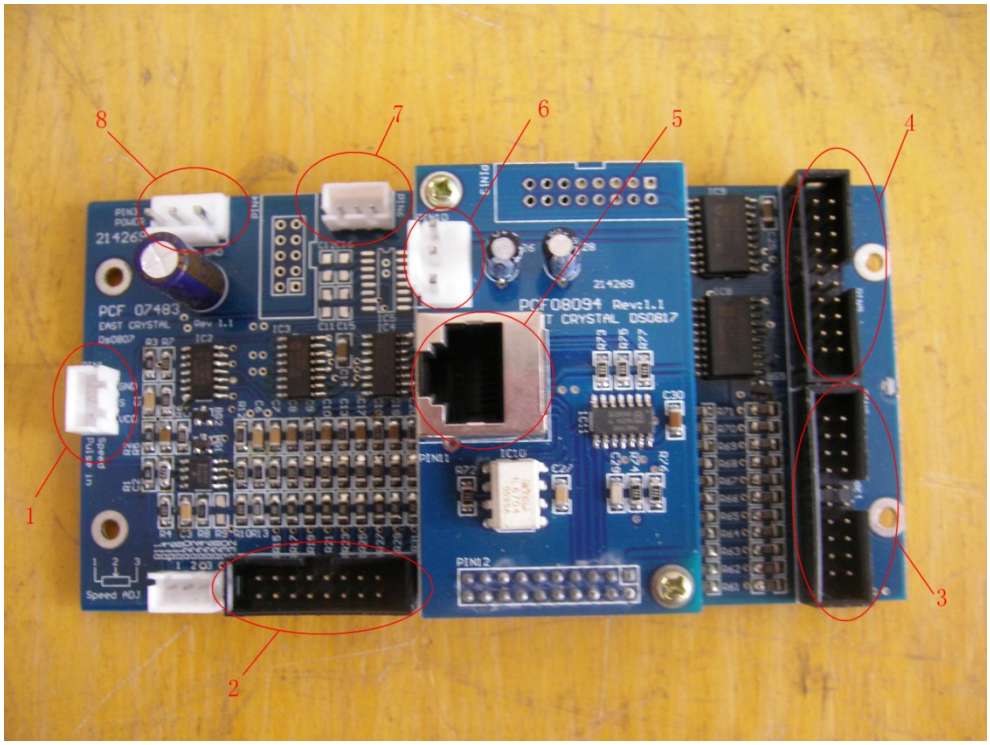
This board is for x4 series



1：12VAC/VDC power input
2：Spindle control port
3：0~10v output signal
4：X-ref(+5V,S,GND)
5：Y-ref(+5V,S,GND)
6：Z-ref(+5V,S,GND)
7：A-ref(+5V,S,GND)
8：E-stop port(S,GND)
9：Connect to parallel port
10：Jumper: use pin 1、2, open charge pump; use pin 2、3: close charge pump
11：Port for X,Y,Z,A,B step motor driver
12：Relay for coolant pump

6.6.2 X4 plus control board instruction

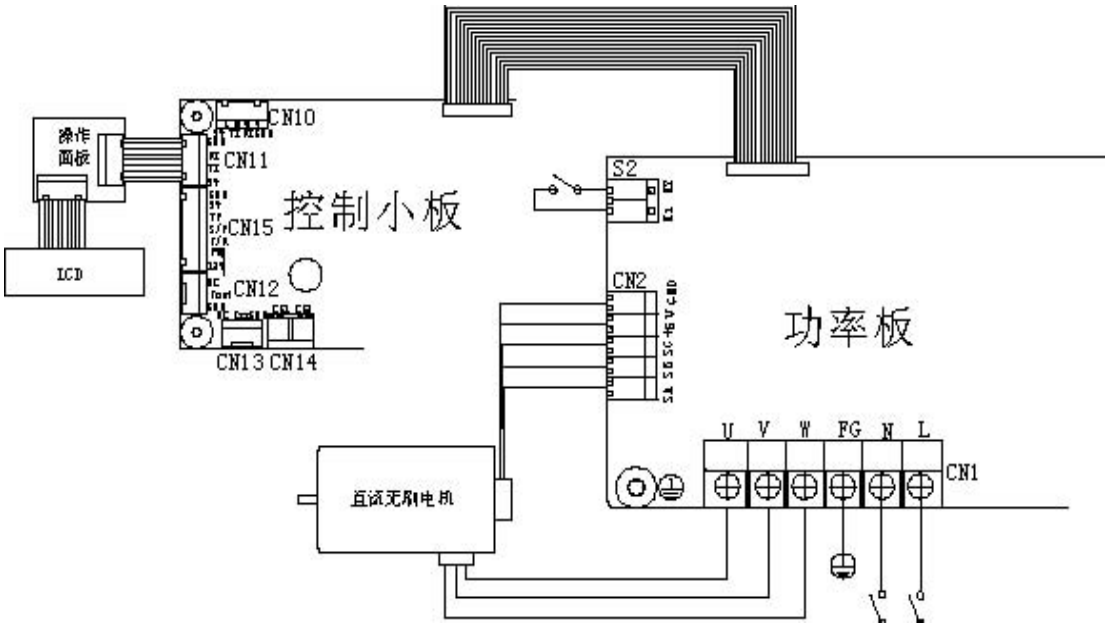
This board is only for x4 plus.



1：Port for feedback of speed
2：MPG port
3：Connect to the parallel port
4：connect to 5 axis interface board
5：port for the signals exchange with front keyboard.
6：afford power to the front keyboard
7：Port for connecting safe pump
8：port for 5VDC power input.

6.6.3Spindle control board

6.6.2.1 View

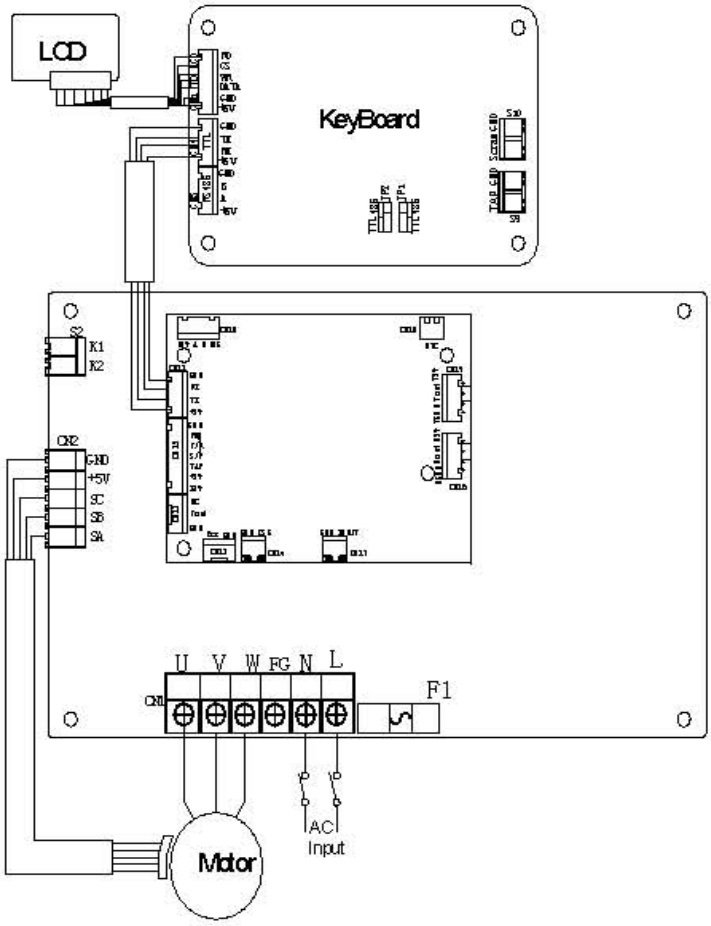


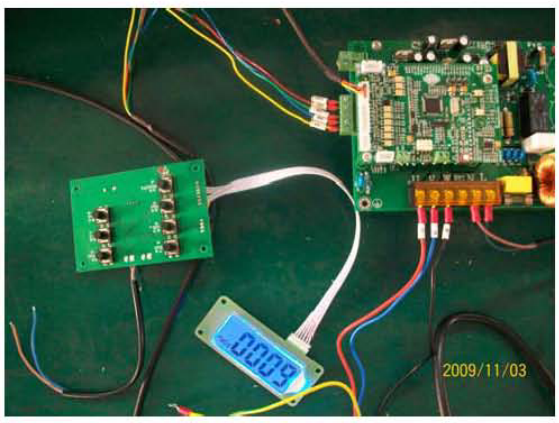
1, the product must be installation, commissioning, operation and maintenance by professional and technical person. the product is electrical equipment, incorrect using or wiring will cause electrical shock, fire, explosion or other dangerous!

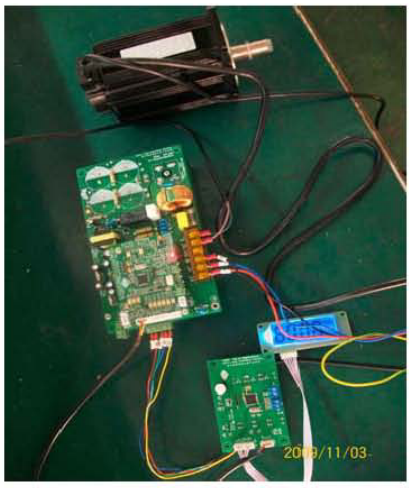
2, when the product is power on (the Power LED lit red), ban to contact with the circuit board and interface

6.6.2.2 spindle driver

voltage	Input current	rated power	rated speed	the lowest speed	motor voltage
AC220V(50Hz) AC110V（60Hz）	10A（AC220V） 16A (AC220V)	1100W	6000RPM	400RPM	DC300V







6.6.2.3 Interface instruction

6.6.2.3.1 Control board for power

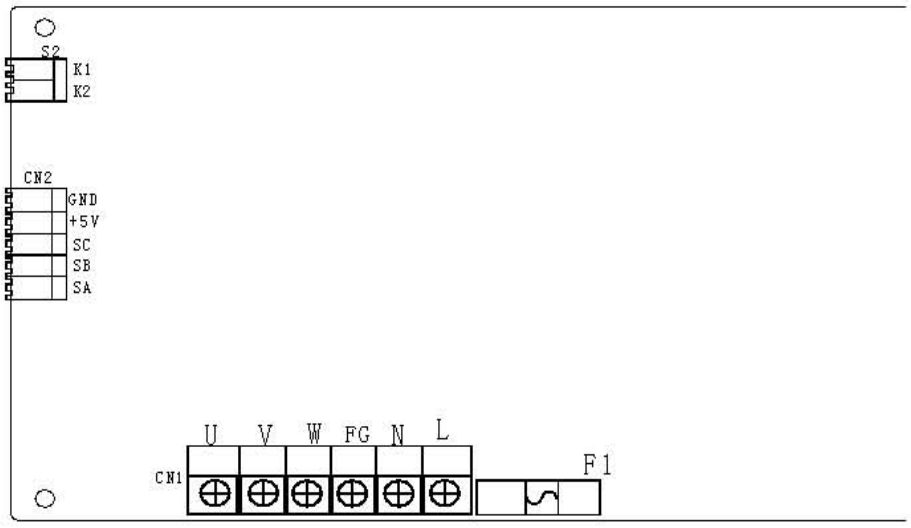
CN1						CN2					S2	
motor input			power			Hall sensor					Limit switch	
U	V	W	FG	N	L	SA	SB	SC	+5V	GND	K1	K2

CN1-motor input and power input, FG is connect to earth

CN2-hall sensor, connect to motor

S2- when you k1,k2 is off, the control board will stop working, when k1,k2 is close-circuit, the board will work.

F1- Fuse



6.6.2.3.2 control board(small)

CN10				CN11				CN12			CN13		
485 serial communication port				TTL serial communication				RPM feedback			Error signal output		
5V	TR	RX	GND	5V	TR	RX	GND	NC	Fout	GND	NC	Err	GND

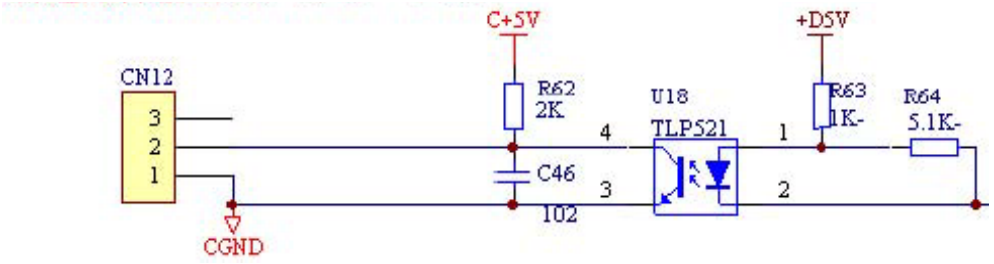
CN14	CN15							CN16			
Enable port for external user	port for external user							Torque output port			
Close-circuit K2 and k2, the port will enable	12V	PWM	F/R	S/P	TP	5V	GND	5V	Nout	GND	GND

CN17		CN18	CN19		
0V—10V analog output		motor temperature detection signal input port	motor temperature protection output		
GND	input	To NTC thermistor	GND	Tout	5V

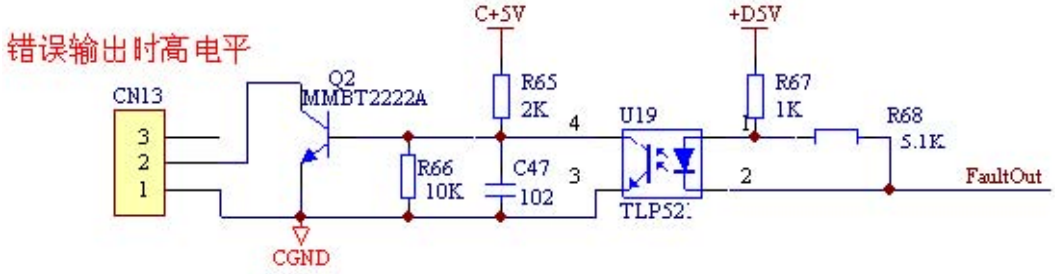
CN10—485 serial communication port

CN11—TTL serial communication

CN12—give the RPM feedback,1 pulse to 1 rpm, you must give 5vdc on the port CN15,or the port will not work.

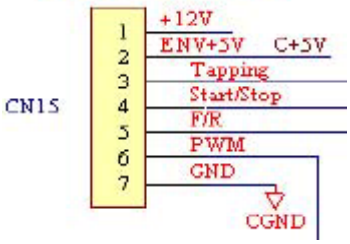


CN13—error signal output, you must give 5vdc on the port CN15,or the port will not work.



CN14—Enable port for external user，if this port is close-circuit，CN11 will be unable，CN15 will be enable。

CN15—port for external user



1 +12VDC

2 +5VDC

3 None

4 None

5 direction signal, low active for forward, high active for reserve

6 PWM input, Control signal for 10%--90% for pwm （Recommended Frequency：1KHz）

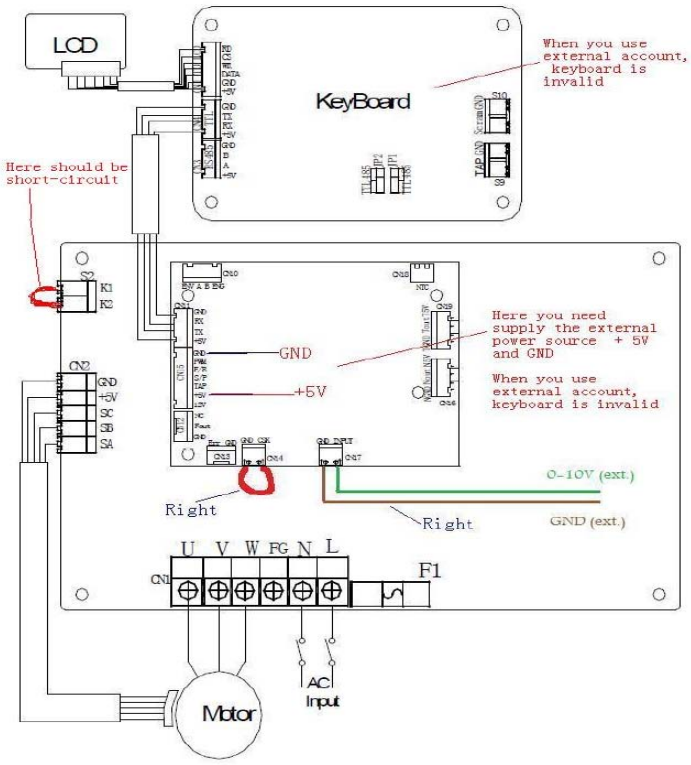
7 GND

CN16—Torque output port

CN17—0V—10V analog output, to control the RPM of spindle.

CN18—motor temperature detection signal input port

CN19—motor temperature protection output



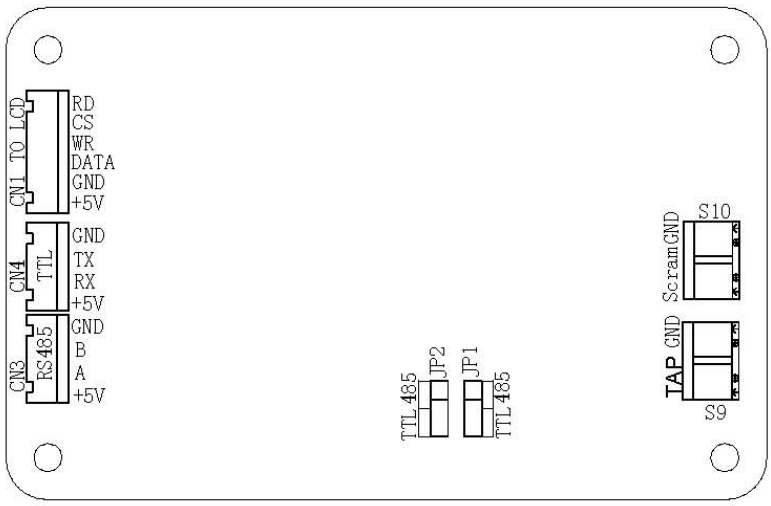
6.6.2.3.2 keyboard instruction

CN1- LCD port

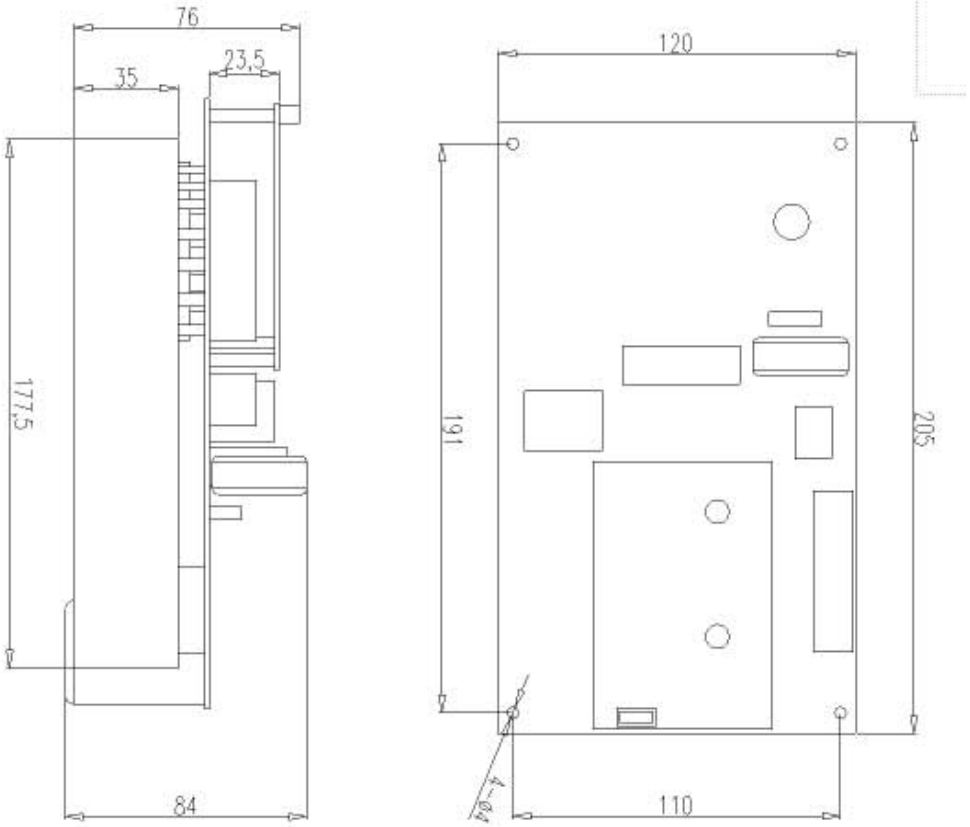
CN3- 485 serial communication port, connect to CN10 of control board.

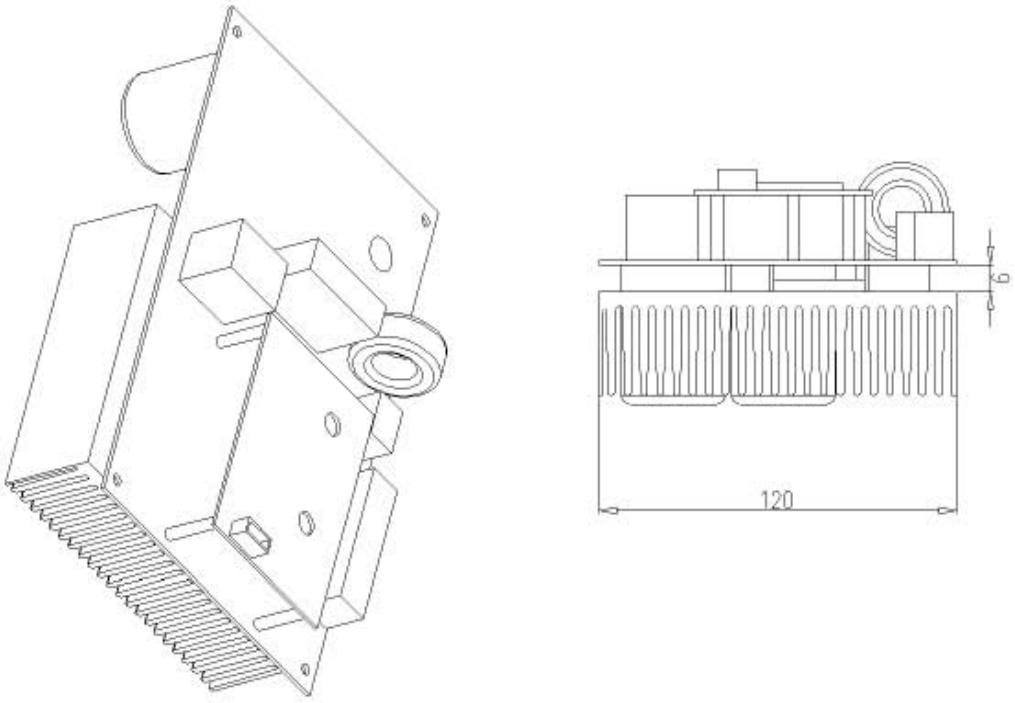
CN4- TTL serial communication port, connect to CN11 of control board.

JP1,JP2-jumper for choosing the 485 serial communication port or TTL serial communication port



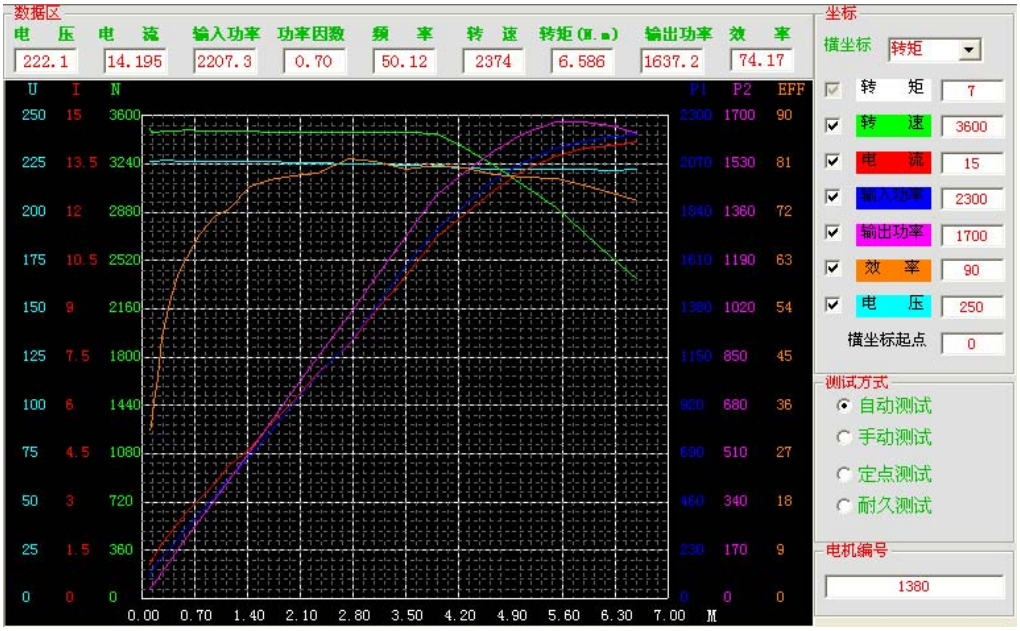
6.6.2.4 mounting dimensions



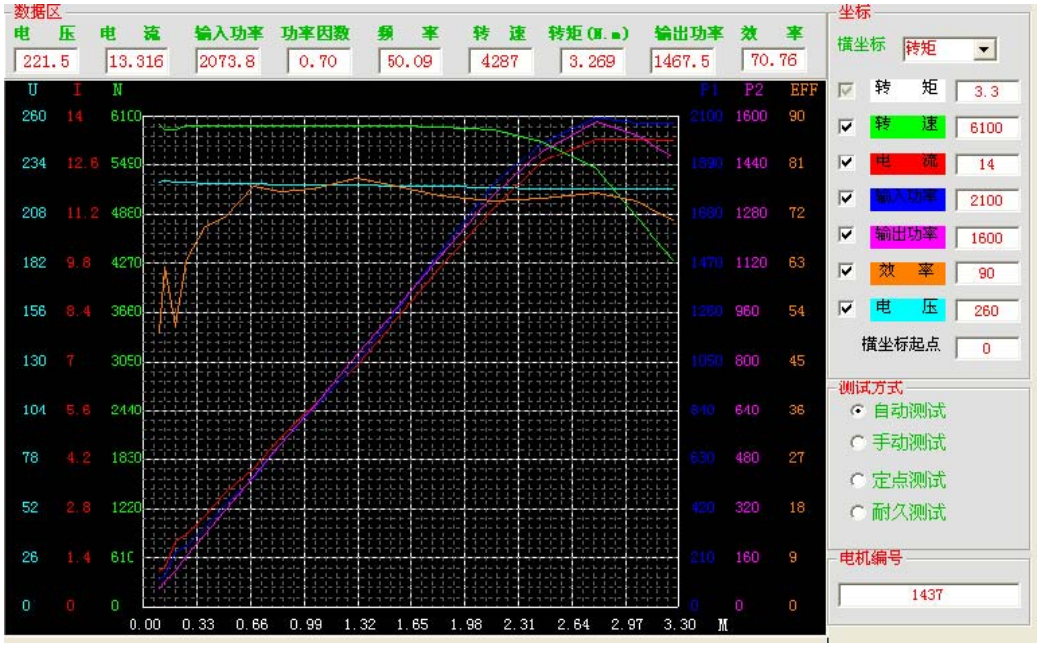


6.6.2.4 characteristic curve

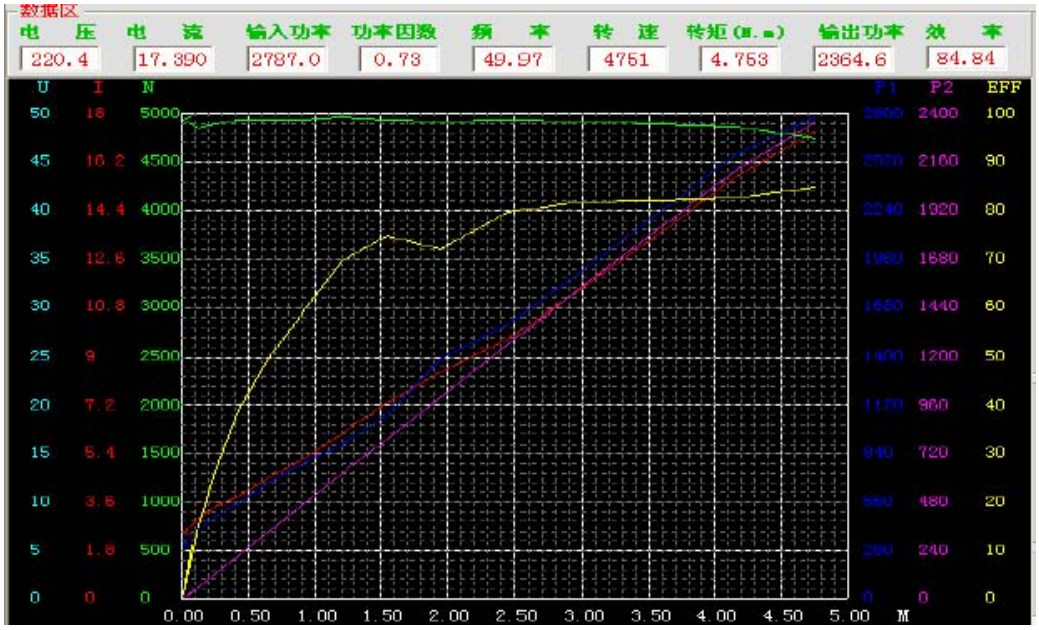
DC300V 1100W 3500RPM



DC300V 1100W 6000RPM



DC300V 2200W 6000RPM



6.6.4 Stepper motor driver instruction

The driver is for x4 series

6.6.4.1 Specialty

- AC20 ~ 50V or DC24 ~ 70V Power Supply.
- Maximum output current of 3A.
- AC servo motor using the current control mode, accurate sinusoidal current output, so that the performance of stepper motor will be close to AC servo motor.
- The performance of motor driver is only a little dependence of different motors, different stepper motor will work well.
- Have a variety of sub-mode
- Have the off-line (FREE) control signal
- Memory location when Electrical power failure
- Auto lock of half-current when stop
- Input and output signal is isolation.

6.6.4.2 Motor Adapter

42、57、86BYG Series Two-phase hybrid stepping motor

6.6.4.3 Input and output signals

Symbol	Function	Instruction
CP+	Step signal input +	Optocoupler opened is effective, minimum pulse width is 2us.
CP-	Step signal input -	
DIR+	Direction signal input +	Optocoupler closed is forward, opened is reverse.
DIR-	Direction signal input -	
FREE+	Off-line signal input +	When Optocoupler opened, the current output is 0A.
FREE-	Off-line signal input -	
POWER	Power directive	Normal power LED light (red)
TIMING	Phase origin directive	Phase origin LED light (green)
ERROR	Failure	Driver fault LED light (red)
A	A pulse output	
/A	A pulse output	
B	B pulse output	
/B	B pulse output	
AC40V	Power input	Rated voltage:AC40V（AC20～50V或DC24V～70V），3A

Attention：Optocoupler is for 5V signal.

6.6.4.4 Single or double pulse setting

Switch（DIP1）	Signal setting
0	CP+/CP- is pulse +，DIR+/DIR- is pulse -
1	CP+/CP- is pulse signal, DIR+/DIR- is direction signal

6.6.4.5 Output current

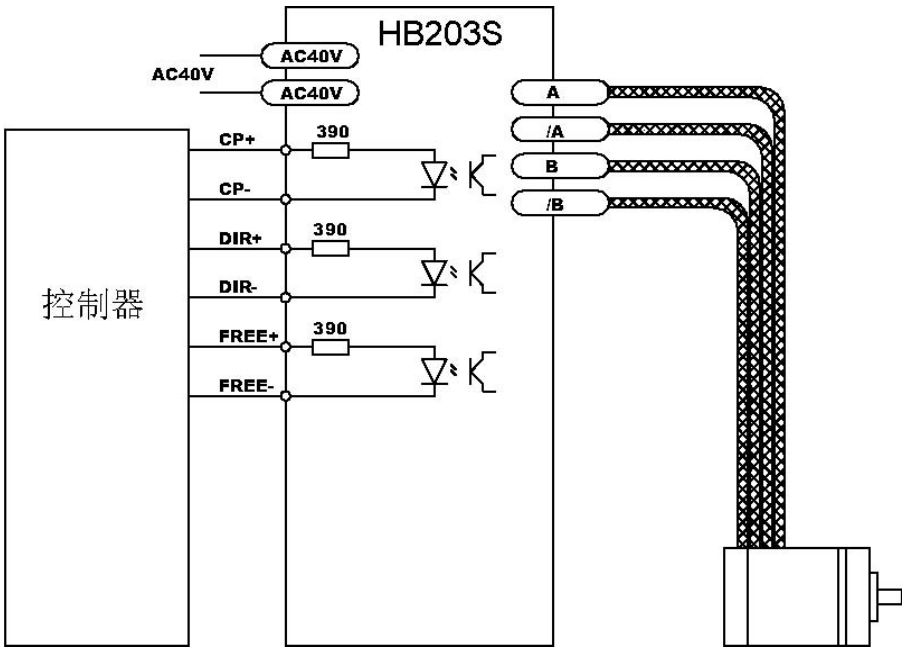
Switch（DIP2 3 4）	Output current（max,units：A）
000	3.00
001	2.75
010	2.50
011	2.25
100	2.00
101	1.75
110	1.50
111	1.25

6.6.4.6 Sub-setting

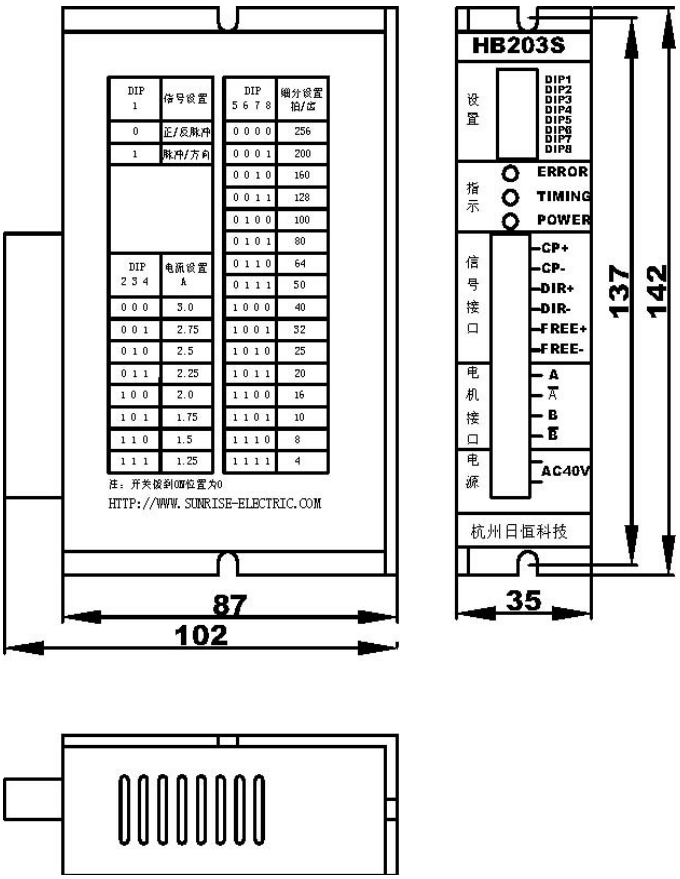
Switch（DIP5 6 7 8）	Sub-setting	Pulse number/round
0000	256	12800
0001	200	10000
0010	160	8000
0011	128	6400
0100	100	5000
0101	80	4000
0110	64	3200
0111	50	2500
1000	40	2000
1001	32	1600
1010	25	1250
1011	20	1000
1100	16	800
1101	10	500
1110	8	400
1111	4	200

Attention：Switch “ON” is “0”.

6.6.4.7 Hardware connection

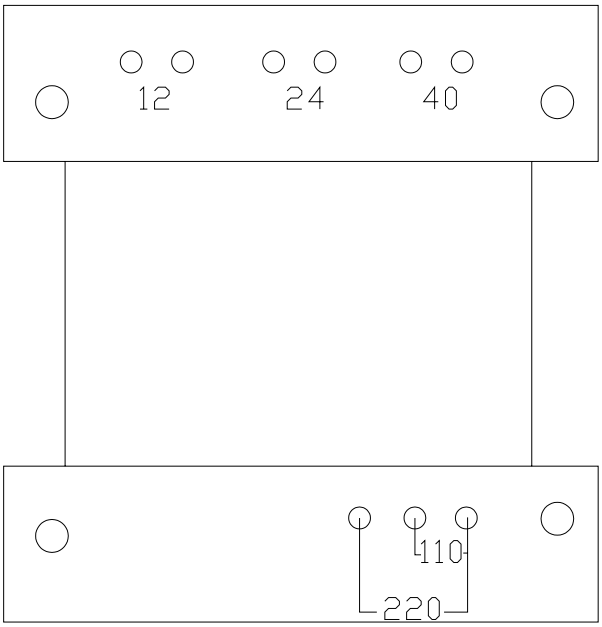


6.6.4.8 Installation size



6.6.5 Transformer instruction

The Transformer is for x4 series



- The transformer is Isolation transformer, the power is 550w
- It support 220vac/110vac input
- It has three output:
  12vac output, the power is 20w.(the point of 12)
  24vac output, the power is 50w.(the point of 24)
  40vac output, the power is 480w(the point of 40)

6.6.6 4th Axis instruction

The 4th axis is Optional Accessories, and it's for x4 series

The rotary table are mainly accessories for milling machine, boring machine and drilling machine, they can be used for listing things:

1. circular cutting, the table in graduated with a 360° scale
2. angle setting
3. boring
4. spot facing operations
5. similar work in conjunction with a milling machine
6. indexing
7. in a vertical position to enable to carry out center work with the help of tailstock
8. the dividing plate accessory allows the operator to accurately divide the 360° rotation of the clamping surface into divisions of all divisible of 30′

Specifications:

Diameter of rotary table:	¢100 mm
Height of center for horizontal mounting:	73 mm
Taper of center bore:	MT#2
Width:	8mm
Width of locating key:	8mm and 10mm
Angle of T-slot:	90°
Height of center for ver.Mounting:	68mm
Driving ratio of worm gear:	1:72
Module of worm gear:	1
Graduation on table circumference:	360°
Max feedrate:	600mm/min

7. Troubleshooting

7.1 Overview

This section is very important, if your machine has issues.

7.1.1 Attention

Our machine is an intergration of mechanical components, Digital components, electrical components, personal computer and software.

The following are some events which may cause the machine not work correctly.

- The machine was transported, and wiring may have come loose
- There was a thunderstorm w/ lightning since the machine was last used and now the electronics do not work.
- There has been water in the area where the machine is located
- The machine is in unheated outside building.

7.1.2 Troubleshooting overview

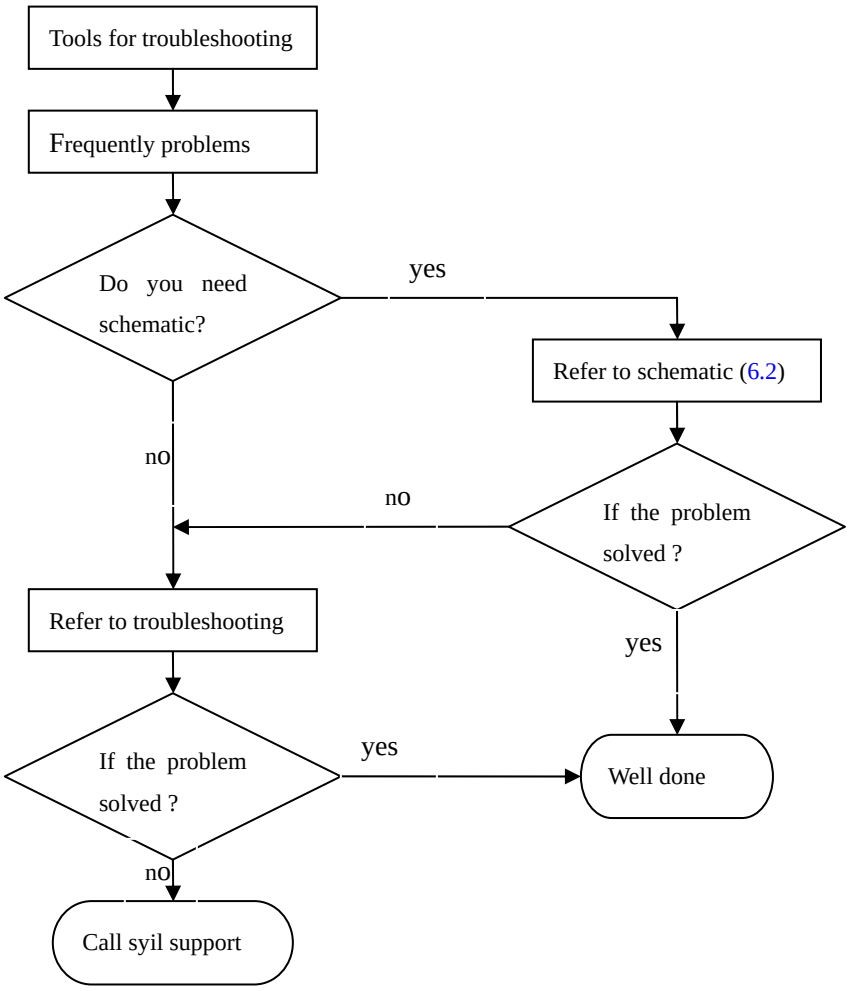


Figure 7-1

This is the troubleshooting overview, as Figure 7-1,you can try to solve the problem as above, the next will instruct the all process detailed.

Attention for troubleshooting:

- Have knowledge of how machine is supposed to work.
- Divide and conquer—focus on one area
- Analyze what has changed
- Work smart—do the easy and obvious tests first
- Complete one test before starting another.

7.1.2.1 Tools for troubleshooting

7.1.2.1.1 Safety

- ***Never do anything with machine power on*** **that can be done with machine power off.**
- **Wear eye protection and use appropriate protective clothing such as gloves**
- **Don't wear loose clothing**
- **Don't wear jewelry as this can contact electrical componants.**
- **Do not do any electrical testing if the floor is wet.**
- **Do not plug machine in to receptacle if floor is wet.**
- **Be very cautious on which electrical components your are going to touch, as capacitors can hold a charge even with the machine powered off.**
- **Think about each move you are going to make prior to doing so, and if you are unsure do not proceed.**
- **Focus on the specific task, as working on electrical components can be very dangerous.**

7.1.2.1.2 Tools for troubleshooting

- Good lighting (trouble light or a headlamp or flashlight)
- A digital multi-meter that can test AC volts, DC volts and resistance.
- Assorted non magnetic rubberized screwdrivers.
- A wire stripper
- Measuring tools: Tape measure, Calipers, Dial Indicator(Optional).

7.1.2.1.3 Frequently problems

There are several problems frequiently, if your machine has issues, you can try to solve the problem by doing the following.

- *Loose wires*:

  There are many wiring connections, it only takes one loose connection to cause the whole machine to fail. Syil has ensured the wiring connections are tight at the factory, but when the machine is shipped to you ,the connection may come loose. The first thing to always check is the wiring connections, tighten all harnesses.

• Poor cable connections:

As the same reasons for above, the cable also may become broken or loose, if the machine cannot function normally, please check all cables(include all the cables inside of the control box and the parallel port cable), if you find that a wiering harness is broken contact your local regional dealer or Sales@syil.com.cn

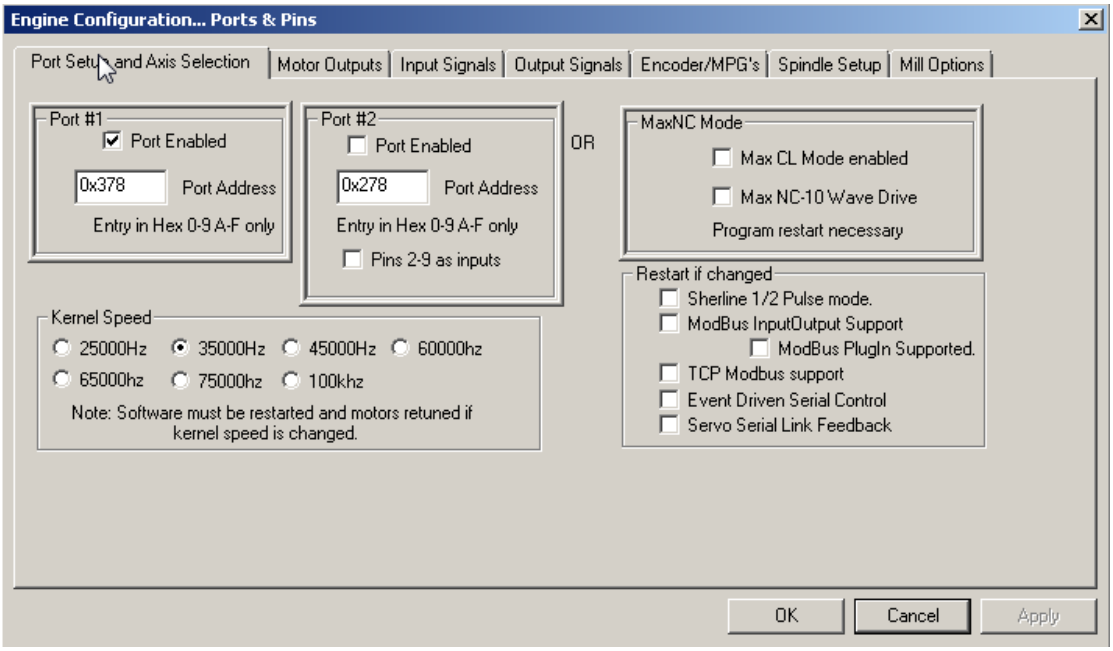
• Software and parallel port problem:

It is best to, restart software or reinstall mach3, the problem may be solved ,if you change any setting in mach3 ,this may also cause a mach3 error.

If mach3 works and the machine works but there is still no communication to the machine, You should check your computers parallel port. It is possible for the personal computer port to be broken ,there is two ways to solved the problem:

1.Change the mother board of your computer or change another computer and test again.

2.Purchase a PCI-Parallel board and install it on the PCI port of your motherboard. Be aware that the port address will change, you will need to change this address in the (ports and pins) settings in mach3.



SYIL DOES NOT ADVISE USING A LAPTOP COMPUTER TO RUN MACH3, AS LAPTOP COMPUTERS PARELLEL PORTS CAN HAVE ISSUES WITH KEEPING THE PROPER 5V SIGNAL REQUIRED. You will see the same warning on the mach3 web site.

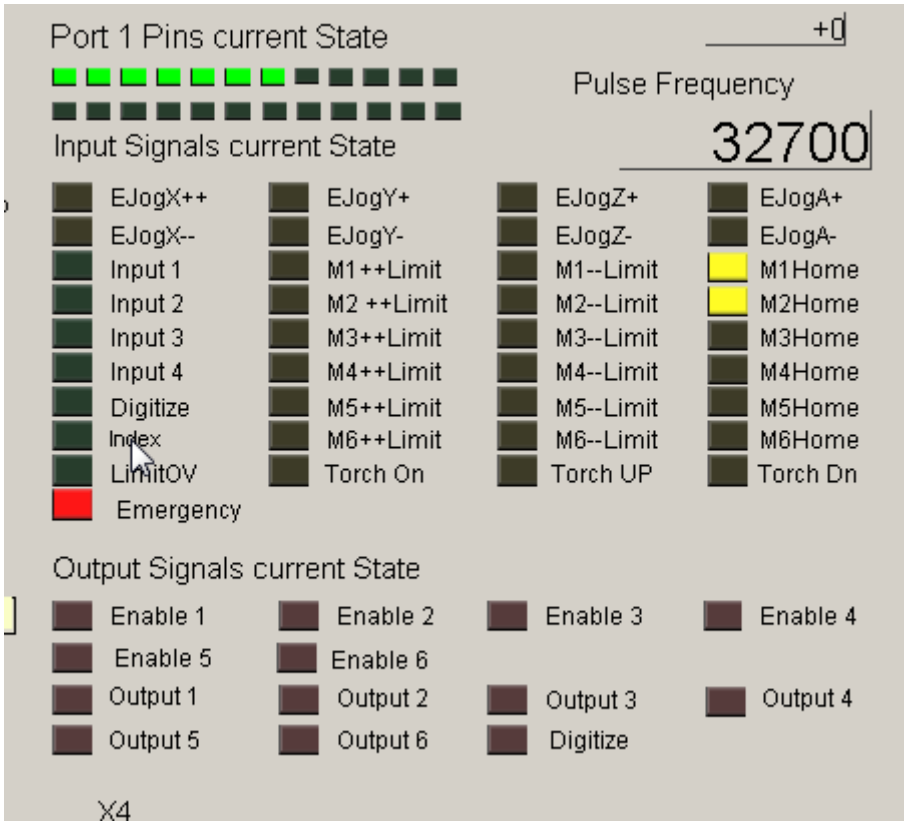
• Sensors

The homing sensors are install on each axis, these switches are used for homing the machine, if the sensors is broken, the machine will loose the homing

function. To Test go to the diagnostic screen in mach3, depress the switch on the x or y axis. You will see the lights light up.

These are not limit switches and by default will not stop you machine from going past them. Mach3 has a function called (soft limits) this function can be turned on from the main screen for mach3 and set up in the homing/limits settings. This is found under the "Config" menu in mach3. For more reference please check the

mach3 manual, this can be found @
http://www.machsupport.com/documentation.php



This is also a good way to test the communication to the computer.

- Computer

The recommended configuration of computer: CPU is 1GHZ, EMS memory is 256MB, hard disk space is 150MB,if the computer is old, mach3 may not will run.

- unlicensed software

When you run program in mach3,the program may limited in 999 lines, because yours is demo version, you will need to buy the license, and there will no line limiting.

- Unexplained stop

  This may be caused by electrical noise, this can be caused by the homing switch, it is important to use good quality shielded cables.

7.1.2.1.4 Syil support

support@syil.com.cn
sales@syil.com.cn
0086-574-62735995

You can send email for troubleshooting in anytime, or call us in work time, the work time is 8:00-17:00(GMT+08:00),prior to contacting us ,be sure you have the following information.

- Serial number of your machine.(Located on the top of column)
- If you have found a problem the machine, and may need to replace some parts from Syil, we will need to know the date of purchase you, the syil Machines carry a One-year warranty. If the warranty has expired you will need to purchase new components.
- Analyze what might have changed since the machine worked properly.
- Make sure you can repeat the problems.
- Describe the problem as detailed as possible, it will help us to diagnose what will need to be fixed.

7.2 Troubleshooting

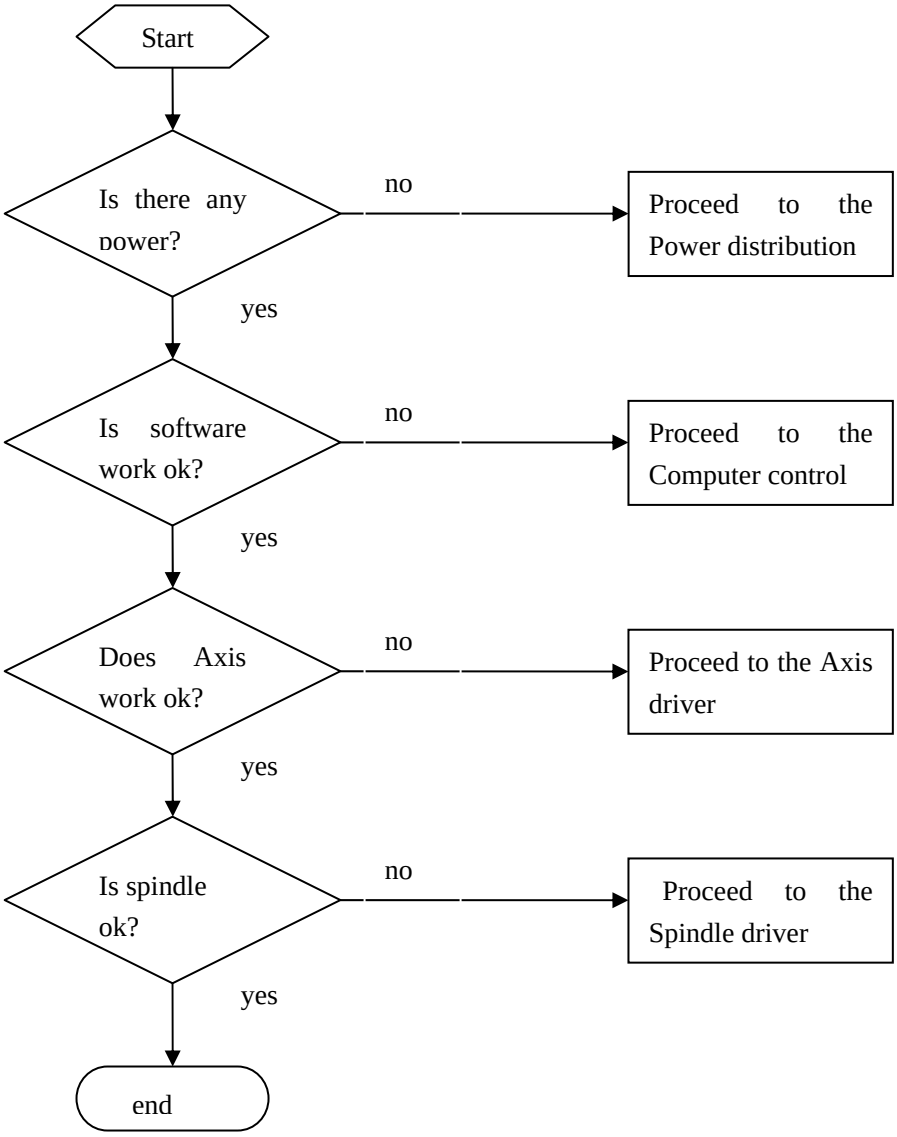


Figure 7-2

The flowchart in figure 9.18 will guide you where to start troubleshooting the electrical system.

This is the power switch, when it switch to "0",the power is disconnect, and when the switch is on "1", the machine will get power supply.(as Figure 7-3)

Most problem of the power supply is caused by the switch.

The following is power distribution check list:

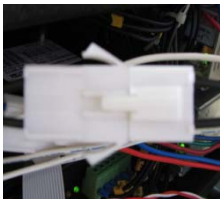
Figure 7-3

7.2.1 Power distribution

parts	Input power	Output power	Remark
Power supply (x4 plus only)	220vac(110vac)	5vdc:supplies power to the x4 plus control board	
Transformer (x4 series)	220vac(110vac)	40vac:Supplies power to the stepper motor driver 24vac:supplies power to the A.C.contactor 12vac:supplies power to the interface board	
Power supply (x4 speed master only)	220vac(110vac)	12vdc:supplies power to the x4 plus control board	

7.2.1.2 Problem resolution checklist for power distribution

Problem	Action to identify cause of problem	How to solve	Remark
•After turning on the power, there is no power in circuit	1. Check the power plug..	1. make sure the connection is good. If the power plug have any problems, replace it immediately.	

	2.Check the switch.	2.if the switch is broken replace the switch. This can be confirmed via volt meter	
• Loose wires in circuit	1.Remove power from machine ,than check ALL connections wires.	1. Find loose wires, and re insert.	
The boards have no power.	1. the spindle control board has no power .	1.Check the fuse or filter, if the board is broken, replace it.	
	2.the five axis board in no power.	2.check the fuse on the board or the power supply to the board,. if the board is broken, replace it.	
Coolant pump is no power supply	1.Check the power plug..	1.if the plug is loose ,tight it.	
	2. Check the second relay.	2.If the relay is not working, replace it.	

7.2.2 Computer control

7.2.2.1 Overview

Mach3 can work well in windows xp.

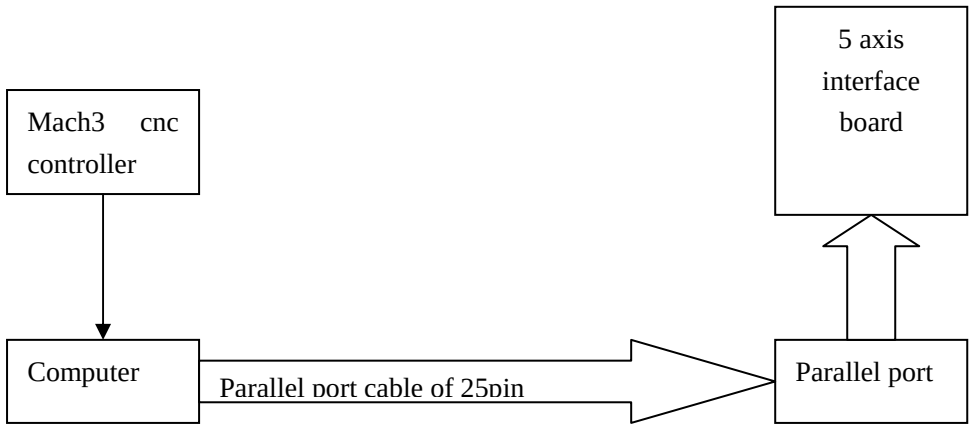
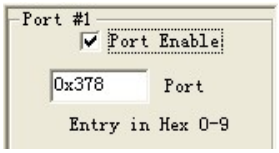


Figure 7-4

7.2.2.2 Problem resolution checklist

Problem	Action to identify cause of problem	How to solve	Remark
The machine can't be controlled by computer	1.check the parallel cable between computer and machine.	1. make sure the connection is good. If the cable has problems, replace it with high quality shielded cable.	
	2.check the parallel port	2. If the parallel port on the machine is broken replace it.	
Mach3 can works, but machine will not work.	1. check the parallel cable	1.Make sure all connections are tight. If the parallel cable appears to have issues, replace it.	

	2. Check that if the mach3 Driver has install properly.	2. Make sure the mach3 driver installed. In the mach3 folder there is a test program ,for the driver	
	3.Make sure that mach3 is working correctly.	3.if suspected that mach3 is not working properly reinstall	
If the machine and the computer is ok, but the machine is still not able to be controled	1.check the power for interface board .	1.if there is no power, check the power supply.(as 6.6.1)	
	2. check the charge pump.	2 make sure the charge pump is working, if the charge pump is not working refer to 6.6.1 as the entire machine will not work	
	3.if you are using a parallel port card, check the address of port1	3.make sure your address is as same as the parallel port card.	

7.2.3 Axis driver

7.2.2.1 Overview

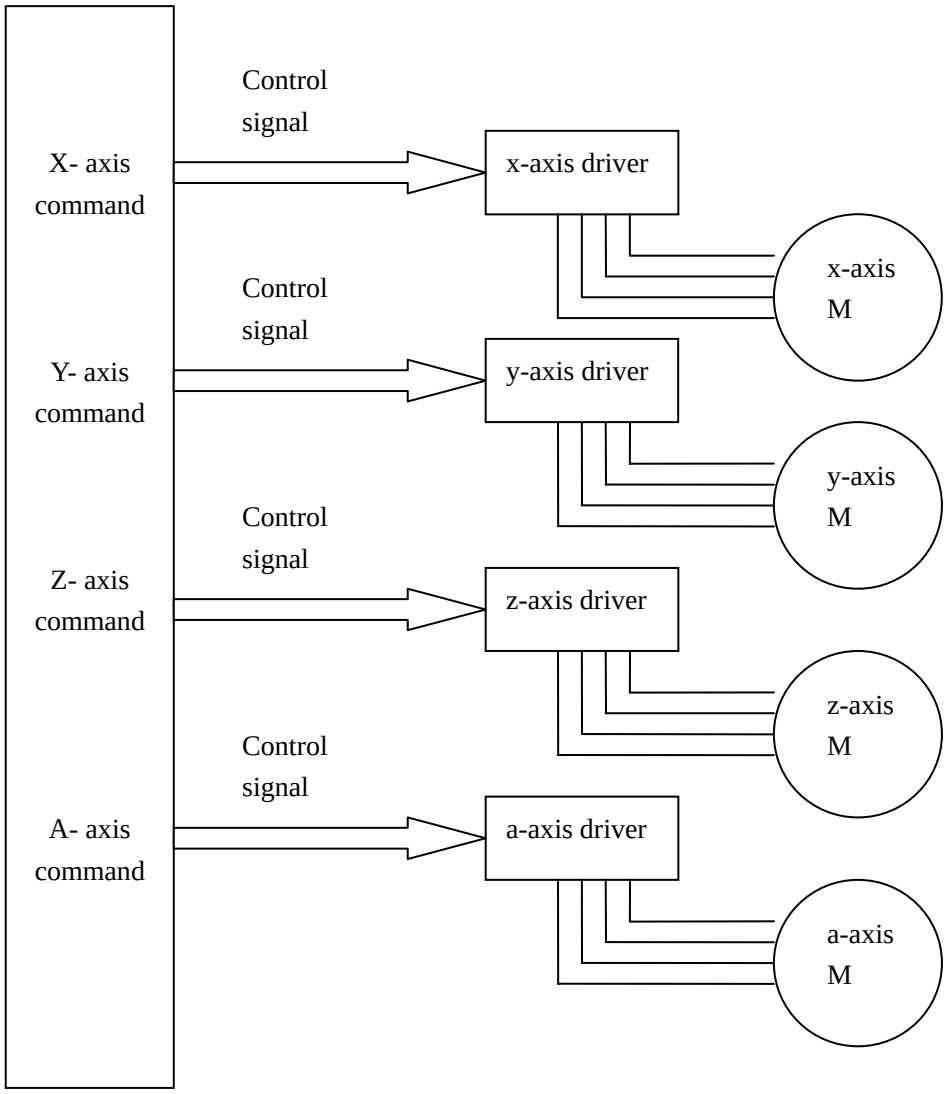


Figure 7-4

7.2.2.2 Problem resolution checklist

Problem	Action to identify cause of problem	How to solve	Remark
A specific axis can't be controlled by computer	1.check the parallel cable between computer and machine.	1. make sure the connection is good. If the cable has issues, replace it.	
	2.check the parallel port	2. if the parallel port is broken replace it.	
	3.check mach3	3.if the software is broken by unknown problem, reinstall it	
stepper motor looses steps when machining.	1. check mach3	1.check mach3, and reinstall.	
	2.check step motor and wiring, For example, x, axis have some problem, you can do as Figure 7-6	2. if stepper motor have having issues, replace it. Do not unplug stepper motor with machine on and computer on. This will cause 5 axis card to not work	
stepper motor driver is not work.	1.check the power supply for driver	1.if the driver is no power, check the wiring.(refer to 6.6.3)	
	2. do as Figure 7-5 to check the cable of control signal.	2 .if the cable is broken, replace it	

The driver and the stepper motor are working, but the axis is not moving.	1. Check the coupling on the motor.	1. if the coupling is broken, replace it.	
axis is limited by limit switch or e-stop switch	1.check the homing switch	1.If the homing switch not working replace it. Refer to *7.1.2.1.3 Frequently problems*	
	2.check the e-stop switch	2. if the e-stop switch is not working replace immediately, **do not change settings in mach3 to disable switch!**	
Mechanical problem	1.Gibbs are too tight or too loose	1.Adjust Gibb set screws	
	2.oil not getting to the ways	2.investigate oiling system for lack of oil and/or plugged lines	
	3.debris on ballscrew.	3.clean ballscrew	

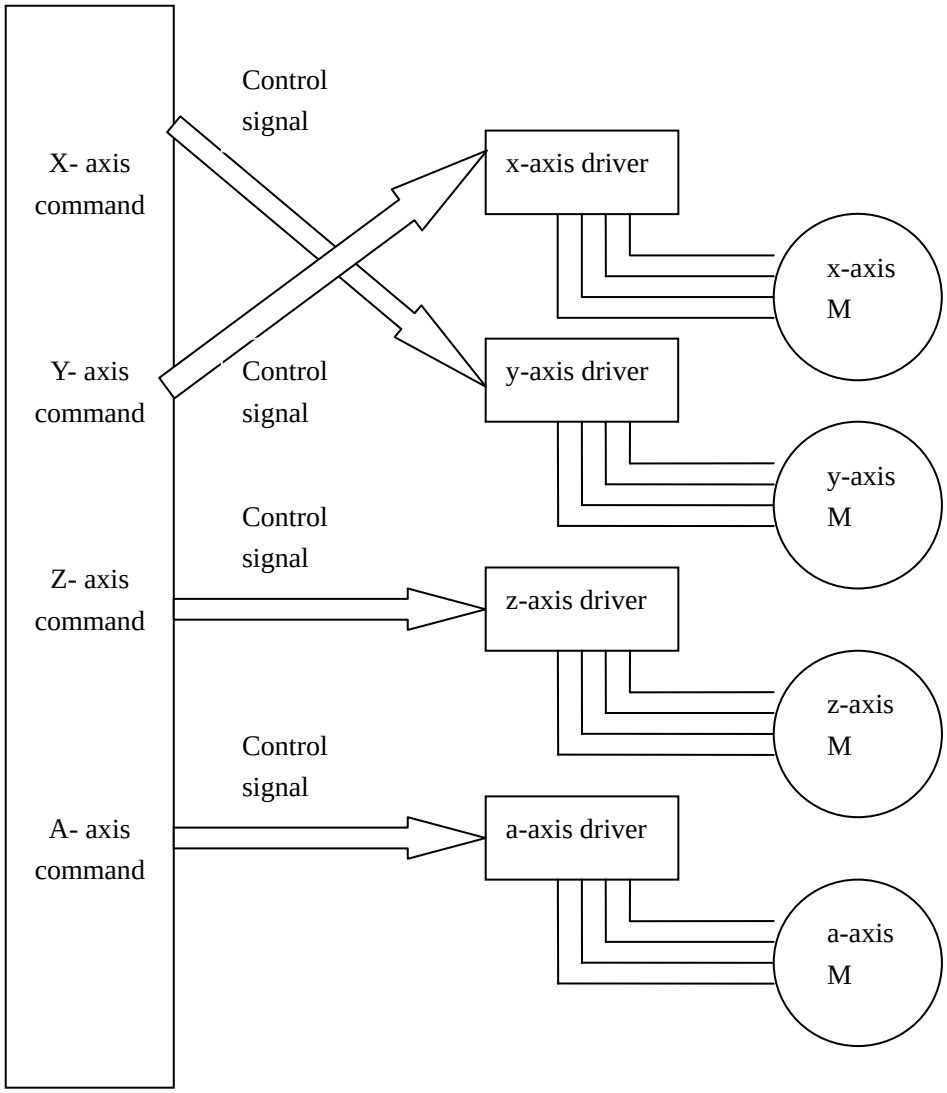

X- axis
command
Y- axis
command
Z- axis
command
A- axis
command
Control
signal
Control
signal
Control
signal
Control
signal
x-axis driver
y-axis driver
z-axis driver
a-axis driver
x-axis
M
y-axis
M
z-axis
M
a-axis
M

Figure 7-5

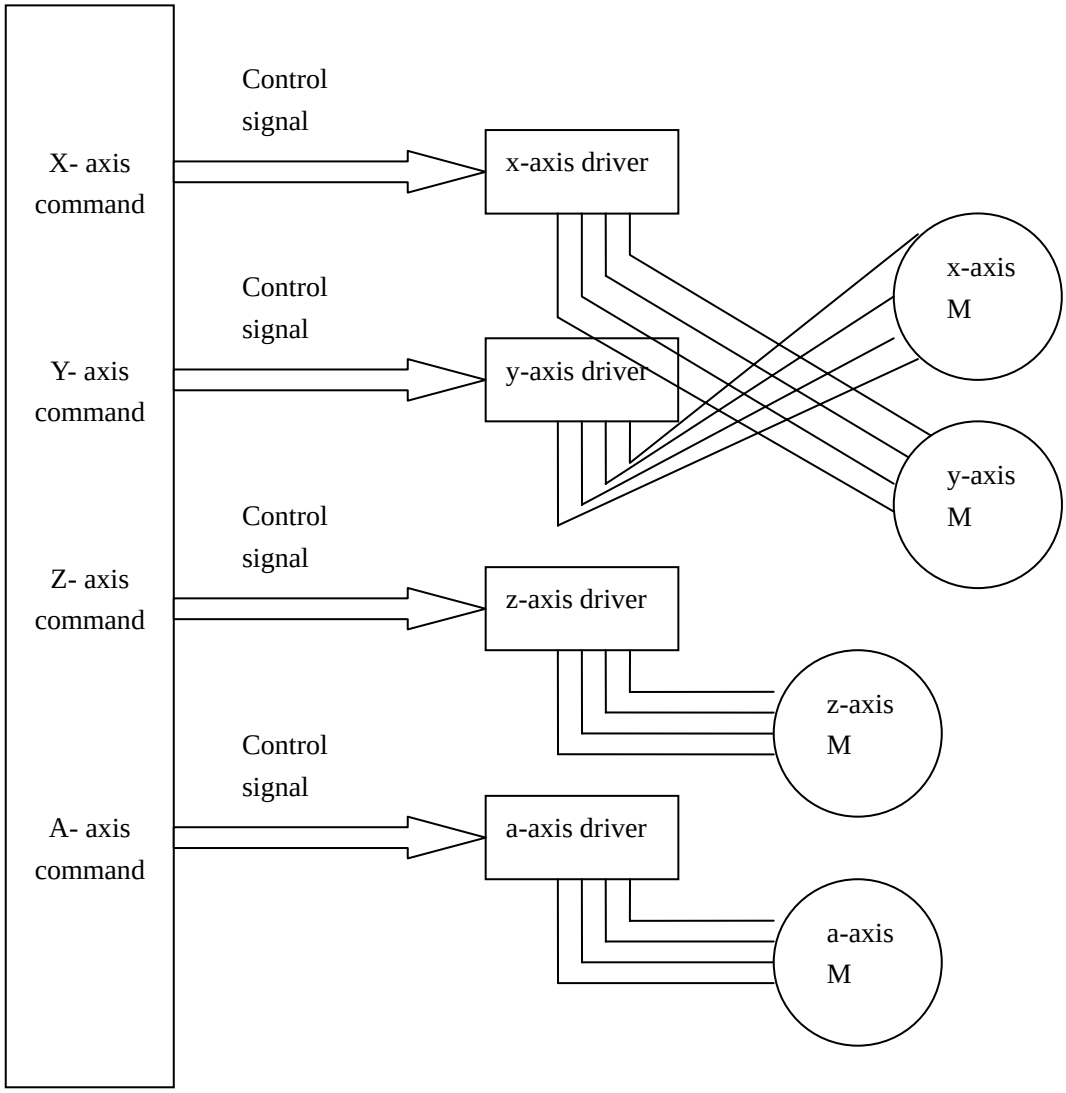

Control
signal
X- axis
command
x-axis driver
x-axis
M
Control
signal
Y- axis
command
y-axis driver
y-axis
M
Control
signal
Z- axis
command
z-axis driver
z-axis
M
Control
signal
A- axis
command
a-axis driver
a-axis
M

Figure 7-6

7.2.4 Spindle driver
7.2.4.1 Overview

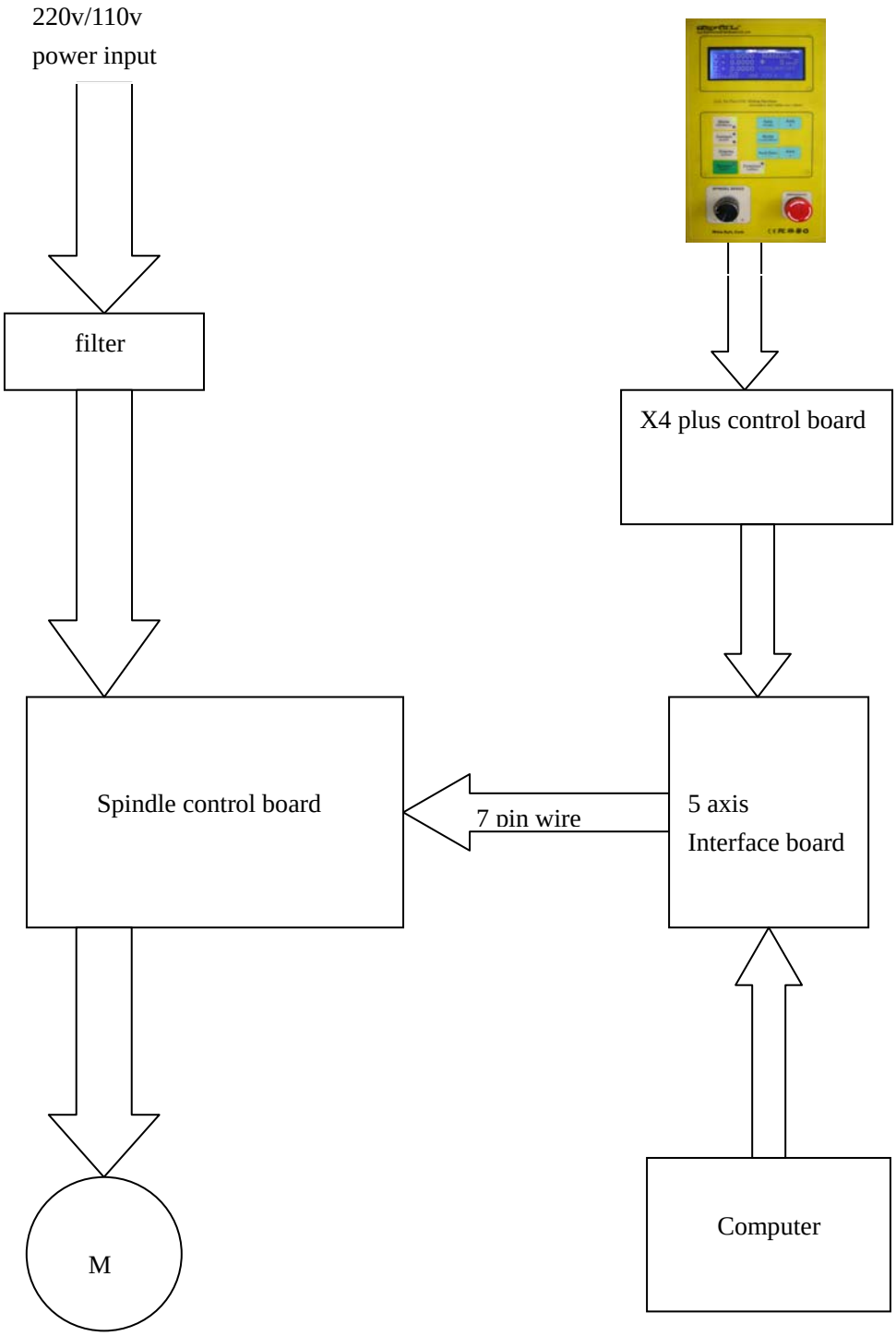
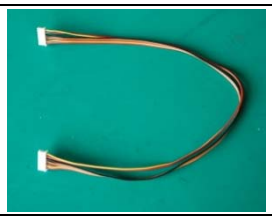
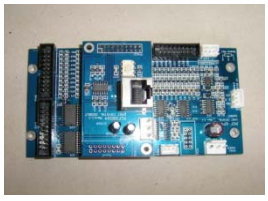
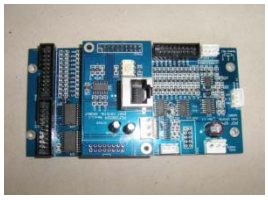
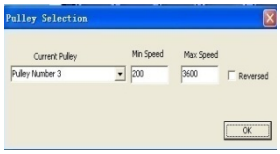


Figure 7-8

7.2.4.2 Problem resolution checklist

Problem	Action to identify cause of problem	How to solve	Remark
The spindle can't be controlled by computer.	1.check the parallel cable between computer and machine.	1. make sure the connection are good. If the cable have suspected problems, replace it.	
	2.check the parallel port	2. if the parallel port is broken replace it.	
	3.check mach3	3.if the software is broken by unknown problem, reinstall it	
	4.check the 7 pin wire	4.if the wire is broken, replace it	
	5.check the x4 plus control board	5.If the board have some problem, replace it	
	6.check the spindle control board	6.if the spindle control board is broken, replace it. To test check that the board is getting power.	
	7.check the spindle motor	7.if the motor is broken ,replace it	

	8.check the wire which connect to keyboard	8.If the switch is broken, replace it.	
The spindle can't be control by manual mode	1. check the wire which connect to keyboard	1.If the switch is broken, replace it.	
	2.check the x4 plus control board	2.If the board have some problem, replace it	
	3.check the Potentiometers	3.If the Potentiometers have some problem, replace it	
	4. check the 20 pin cable which connect to 5 axis interface board and parallel port	4.If the 20 pin cable is broken, replace it.	
The spindle does not achieve programmed RPM. For example, use"m3s1500", but the true RPM is only 1000	1. check set of pulleys in mach3	1.Make sure the pulley is 200 to 3600	
	2.check motor control in mach3	2.Make sure the PWMbase freq. is 1000 to 1500.